INSTITUTION NUMBER

Gas Journal

Vol. 274. 105TH YEAR. LONDON, JUNE 3, 1953. NO. 4696. PRICE 2/6

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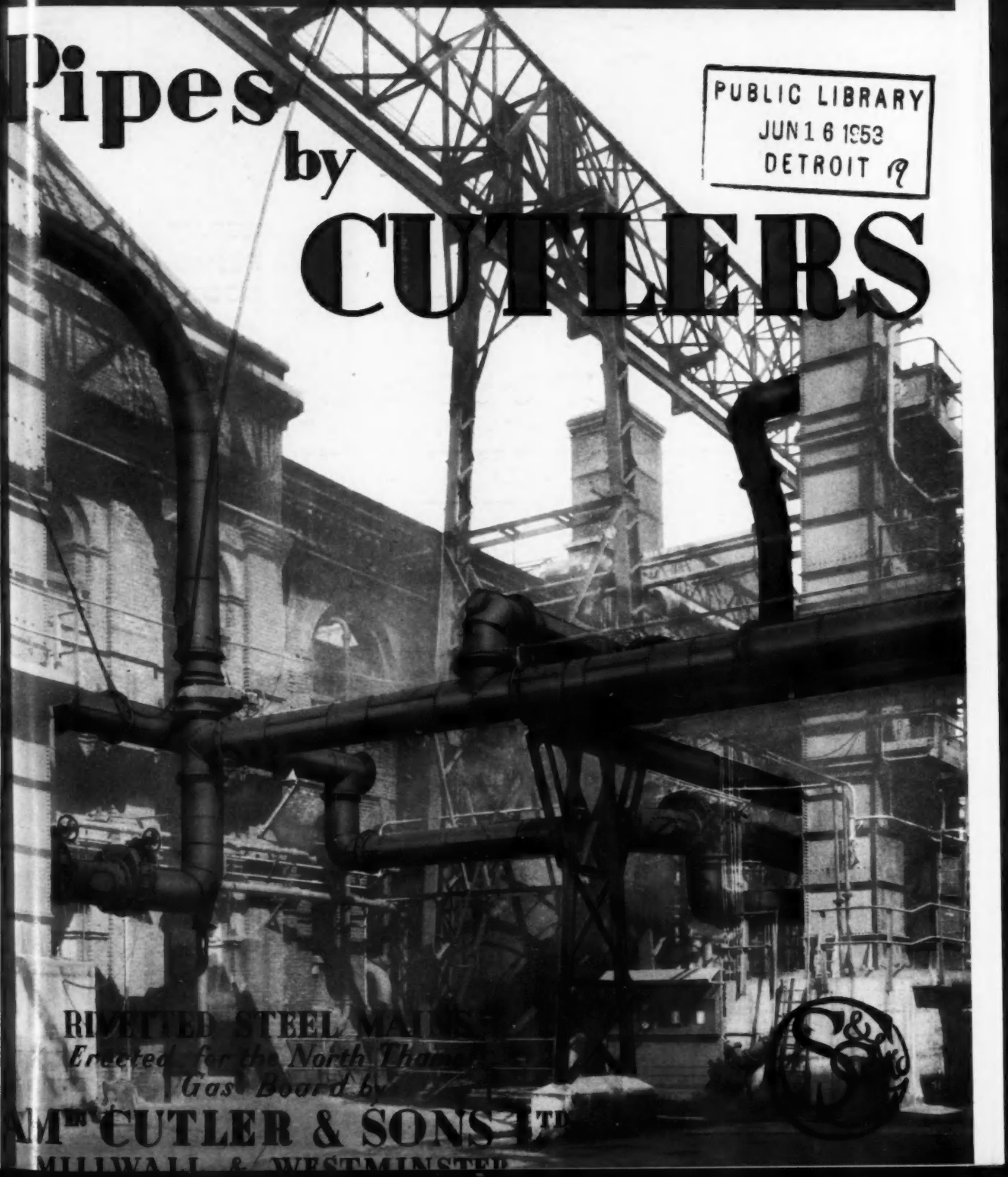

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DOUBLE-FACED GAS VALVES

"HICKS" TYPE WITH INTERNAL SCREW

UP TO 24" - 10 lbs. per sq. in.
OVER 24" - 5 lbs. per sq. in.

THIS VALVE has the following special advantages:—

Access to all working parts for cleaning while valve is under pressure.
The valve is of the parallel slide type and cannot jam.
The faces are cleaned each time the valve is opened or closed.
The faces and spindles can be lubricated whilst in position, through points provided.
Made in sizes from 6-in. to 48-in.
Vertical or horizontal type.
These valves can also be supplied with external screw if required.

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MALLEABLE VALVE MANUFACTURERS ASSOCIATION

The **BRYAN DONKIN CO LTD** · Chesterfield
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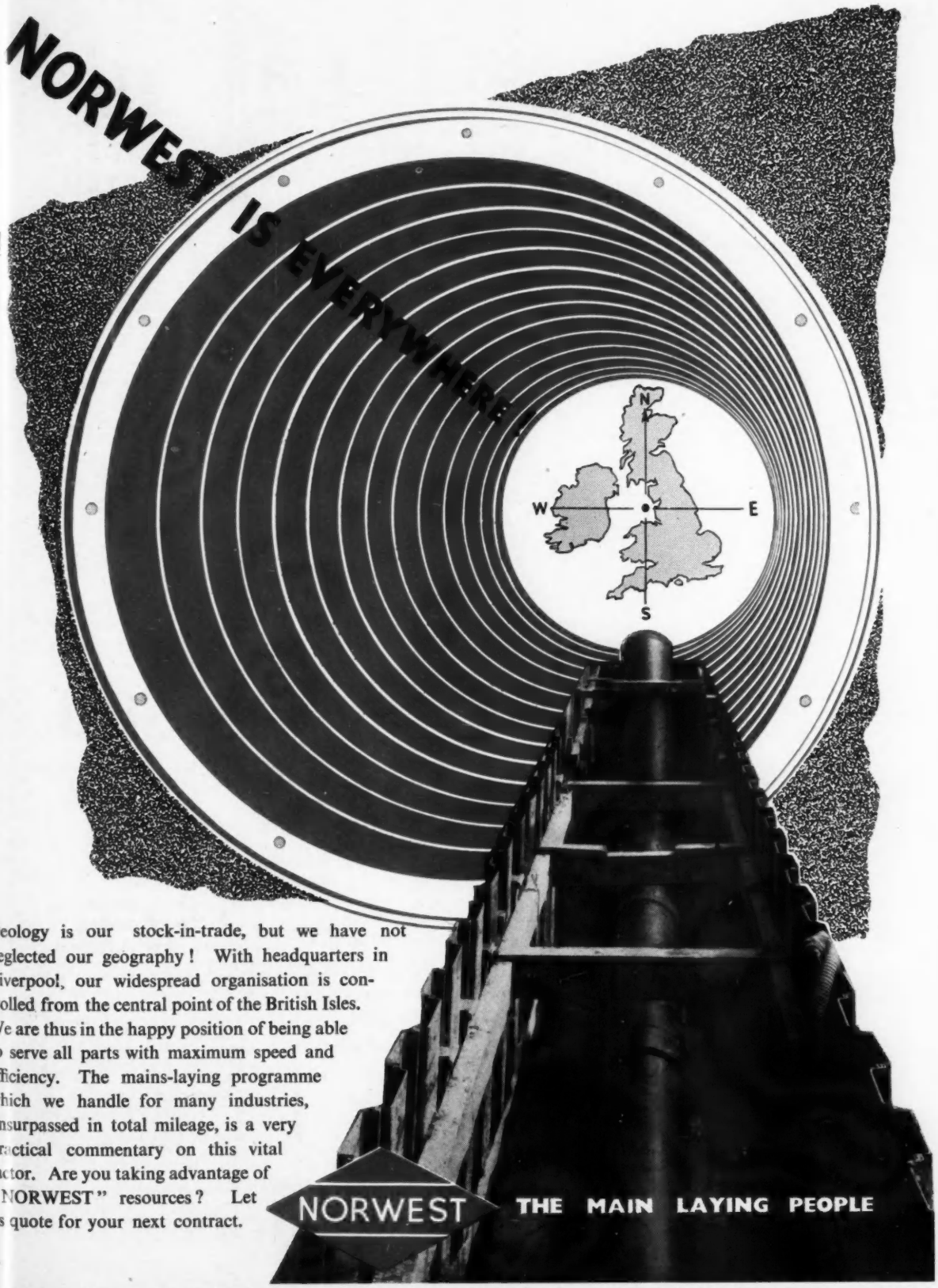

Geology is our stock-in-trade, but we have not neglected our geography! With headquarters in Liverpool, our widespread organisation is controlled from the central point of the British Isles. We are thus in the happy position of being able to serve all parts with maximum speed and efficiency. The mains-laying programme which we handle for many industries, unsurpassed in total mileage, is a very practical commentary on this vital factor. Are you taking advantage of "NORWEST" resources? Let us quote for your next contract.

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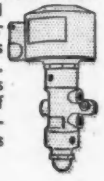
Control - and Decontrol

Efficient control is a matter of knowing just when to let things through. For example, the continuous, efficient control, whether automatic or remote, which Magnetic Valves exercise over water, steam, coal gas, oil, air and other industrial liquids and gases (without glands, stuffing-boxes or driving-shafts) is matched only by the prompt way in which they " fail to safety " if need arises. Let us send you our catalogue, showing the full range of Magnetic Valves up to 12" orifice.

SPECIAL VALVES DESIGNED if required.
STANDARD VALVES DELIVERED ex stock.

MAGNETIC BALANCED 3-WAY VALVE

This valve can be used to control air, water, oils and other liquids, normally passed through a pipe where it is required to operate Diaphragm Valves, single acting and double acting cylinder mechanisms, etc. Standard valves are suitable for controlling pressures up to 70 lbs. per sq. in. or 100 lbs. per sq. in. as required. This type of valve is capable of operating at high speeds over long periods.



A flame proof solenoid housing, Buxton Certified, can be fitted where required

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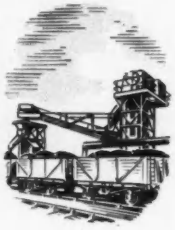
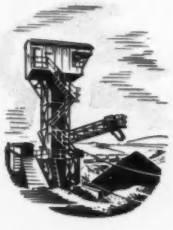
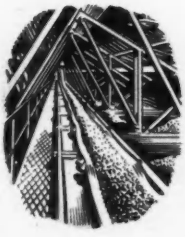
(Manufacturers of Automatic Valves for over 20 years)

MH 12A

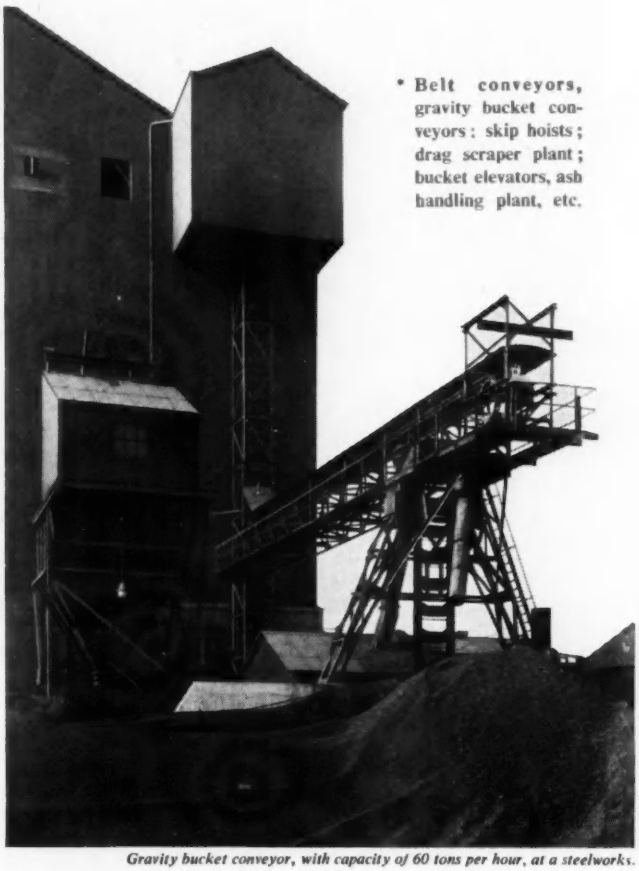
ALL ALONG THE LINE IT'S ICL







The range of ICL material handling equipment is sufficiently comprehensive* to handle almost any loose material from its source to ultimate use or disposal. Progressive design and sound ICL engineering mean more efficient handling all along the line.



* Belt conveyors, gravity bucket conveyors; skip hoists; drag scraper plant; bucket elevators, ash handling plant, etc.

Gravity bucket conveyor, with capacity of 60 tons per hour, at a steelworks.

ENTERPRISING ENGINEERING

by INTERNATIONAL COMBUSTION LIMITED

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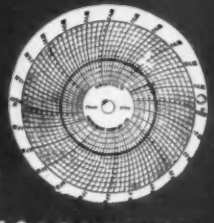
FIG 999

The NEW

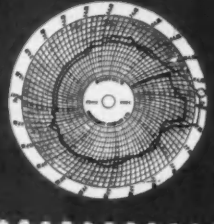
Low Pressure

SERVICE REGULATOR

WITH FIG. 999



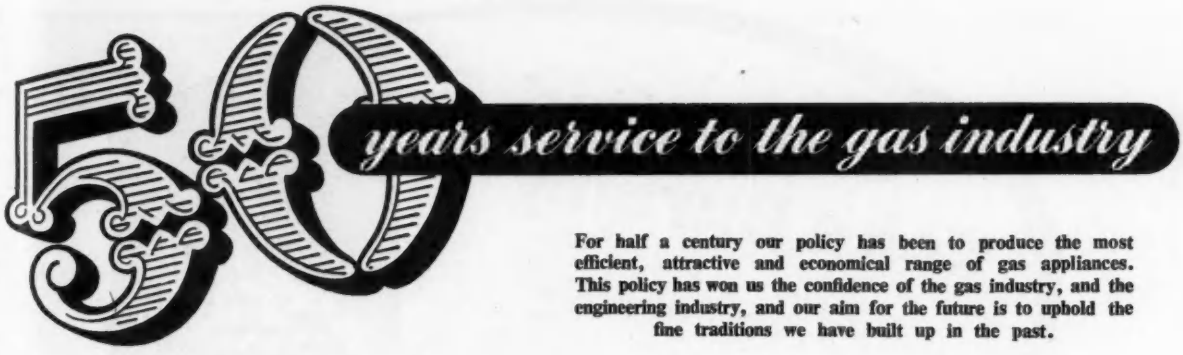
WRITE FOR FULL SPECIFICATION



WITHOUT FIG. 999

ARREST YOUR PRESSURE FLUCTUATIONS RING FOR FIG. 999

THE BRYAN DONKIN COMPANY LIMITED · CHESTERFIELD · LONDON · MANCHESTER



For half a century our policy has been to produce the most efficient, attractive and economical range of gas appliances. This policy has won us the confidence of the gas industry, and the engineering industry, and our aim for the future is to uphold the fine traditions we have built up in the past.

OUR RANGE OF SPECIALISED PRODUCTS INCLUDES

Flameless Radiant Gas Burners with temperature range 600°C. to 1,600°C. for fluorescent tube baking and straightening, tinning baths, pipe creasing and bending, tool hardening, foundry mould drying including resin sand moulds, glass bending, glass colour process, etc.

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Flashrite Burners for biscuit ovens and wire tempering.

Sugar Boilers for confectionery and jam making.

Roasting Machines for malt, nuts, coffee, cocoa beans, etc.

High Intensity Radiant Tunnels for all drying processes, including paint enamelling.

Gas Fired Cremators.

Premix Automatic Mixing Machines for Butane, Propane, Natural Gas and Towns Gas—capacities from 2,000 cu. ft. to 30,000 cu. ft. per hour.

Varnish Boiling Equipment—portable and stationary pots.

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Gas Compressors—10 in. to 80 in. water column outlet pressures ; capacities 1,000 to 30,000 cu. ft. per hour.

Fans for high temperature air-recirculation up to 700°C.

Direct Fired Hot Air Furnaces to any capacity.

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Overhead Space Heaters for factories, churches, canteens, licensed premises, shops, etc. Complete installations undertaken of Supertherm, Veetherm, Golden Glow, Floortherm, Startherm and Air Master Heaters.

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Literature on the above range of products supplied on request

All of the above appliances will operate on Butane, Propane, Natural Gas, Towns Gas or Producer Gas.

We have a staff of fully qualified technical engineers at your disposal.

Detailed working drawings, burners and accessories supplied to customers who wish to build their own furnaces or ovens.

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B

Gas Ignited Coke Burning and Economical

the SOFONO Fire

BURNS ALL NIGHT—*EVERY* NIGHT

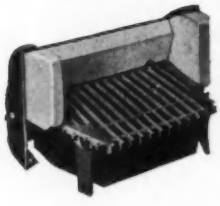
The traditional open fire is regarded as essential in the British home. Cheerful and inviting, it forms a focal point for the whole household and its friends. But, unless the fire is designed to give full efficiency and reduce running costs, the appliance will become expensive and uneconomical.

CONTROL

The patent firebox design and the machined air control device simplifies and improves control of combustion, and a considerable fuel saving can be obtained. The maximum amount of heat is extracted from the fuel and directed as necessary for either or both space and water heating. The air control also allows the fire to burn slowly and steadily all night.

FUEL CONSUMPTION

The Sofono Fire operates efficiently on coal, coke, anthracite and most types of manufactured fuels such as coalite. For overnight burning, slack or dross may be used to advantage.



The fuel consumption can be reduced by the air control, although high rates of burning are possible, when desired. The average weekly fuel consumption for winter operation, including overnight burning, should be 1 cwt.

THE SOFONO TRIVET

The Trivet is an extra—but what a useful one! Pots and Kettles can be kept simmering, and when not wanted the Trivet can be lifted away as easily as it can be slipped into position. Made of hard lustrous or vitreous enamel to match fire.

The Sofono Fire fulfils the British Standard Specifications for Solid Fuel Open Fires and is included in the list of Approved Appliances recommended to Local Authorities. Fully illustrated leaflet, G.J. (1), on request.

EFFICIENCY

The efficiency of the Sofono Fire is judged firstly by its power to obtain a high standard of heat comfort at no additional fuel expenditure. Secondly, by its ability to heat water continuously for domestic purposes by means of a back boiler. Thirdly, to remain alight day and night. Fourthly, to be easily lit, when required, by an optional gas burner and, finally, to be simple to install and maintain.

PERFORMANCE FIGURES

The overall efficiency of the Sofono Fire with back boiler is 40%, which can be increased to 60% in the Convector Model. The air control permits combustion up to a rate of slightly more than 3 lbs. per hour, from which the fire gives a useful output of 19,000 B.Th.U. per hour, nearly 9,000 B.Th.U. per hour as radiation and 10,000, B.Th.U. per hour of hot water.

The Sofono is made in a wide variety of self and blended colours and finished in a hard, lustrous, easily cleaned enamel. Three sizes are available to fit 14-in., 16-in. and 18-in. fireplace openings. Installation is very simple and full details, combined with operating instructions, go out with every fire carton.

A further development is the Convector Model, made only in the 16-in. size at present. This model provides "background" space heating for two or more rooms, in addition to the normal functions of the Sofono as listed above. A complete brochure, G.W. (2), with diagrams, is available on request.

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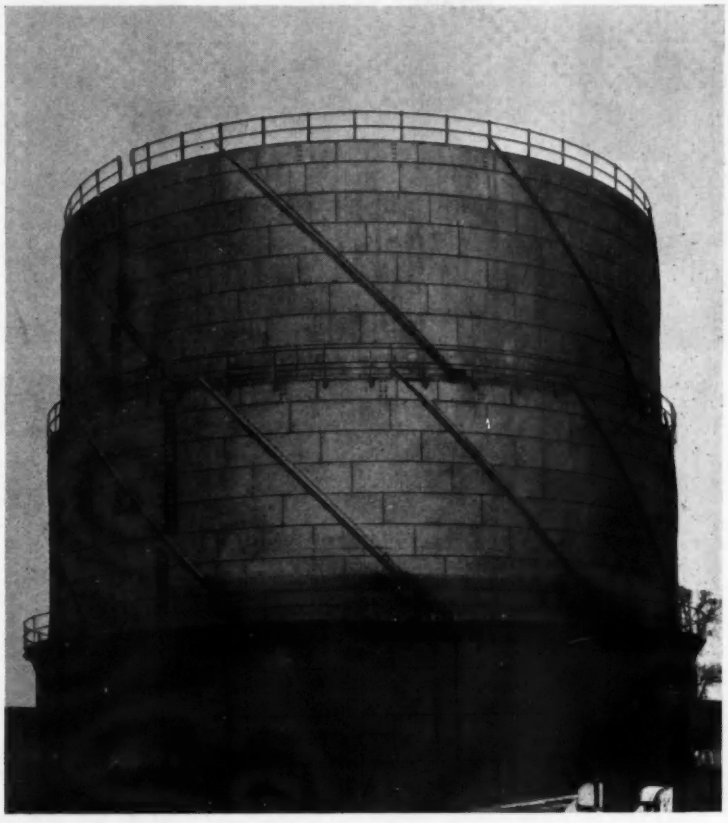
We can justly claim that each and every item of Gas plant being supplied to the Industry to-day is backed by Craftsmanship, Experience, Confidence and Satisfaction in each stage of Design, Manufacture and Erection.



Two Lift Spiral Guided Gasholder 250,000 cubic feet capacity, in Steel Tank. Designed, manufactured and erected for South Western Gas Board.

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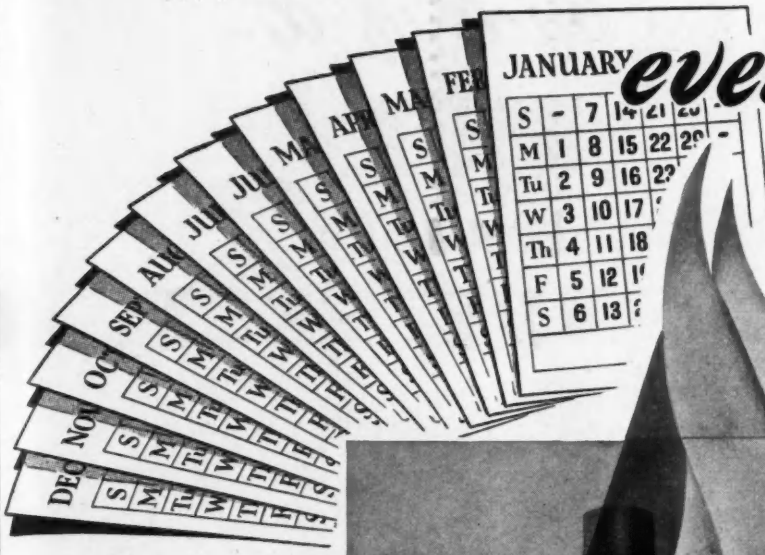
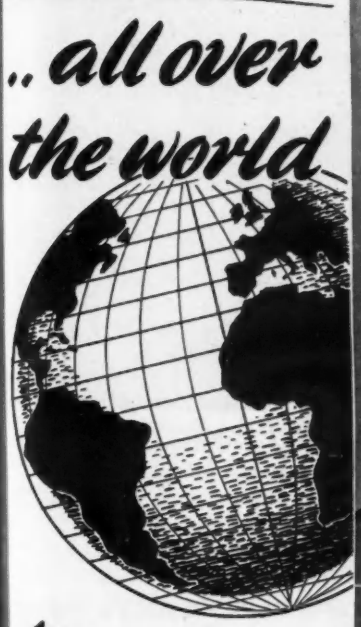
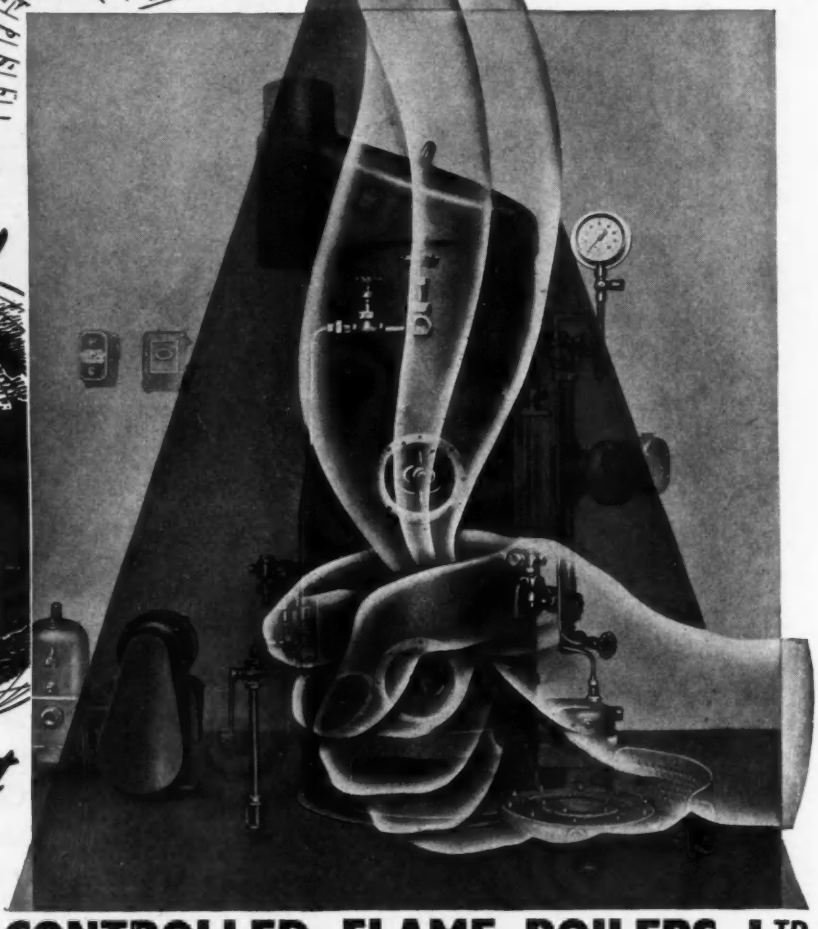


every day in the year..



..all over the world



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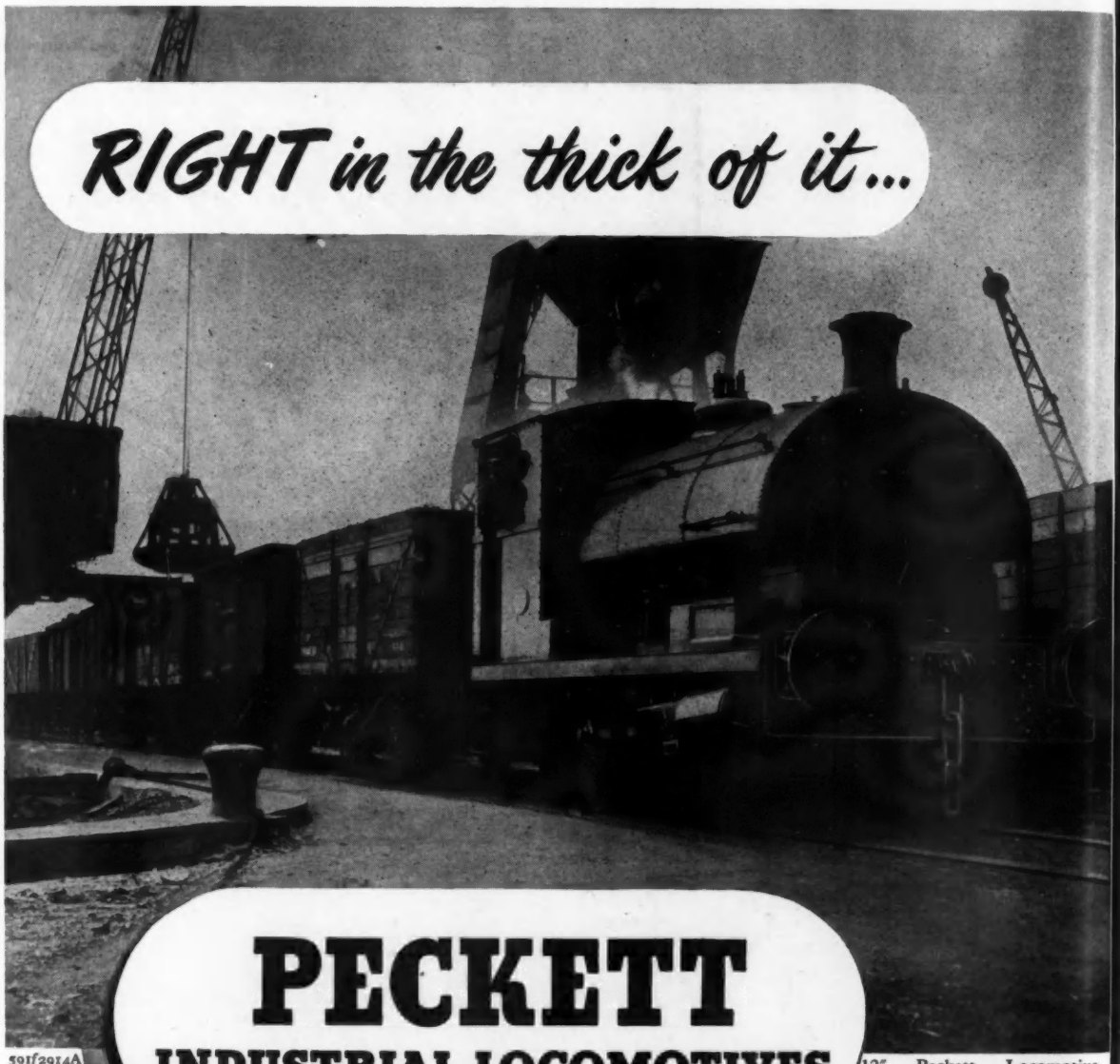

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12" Peckett Locomotive working at Dibles Wharf for Messrs. Southern Wharves Limited

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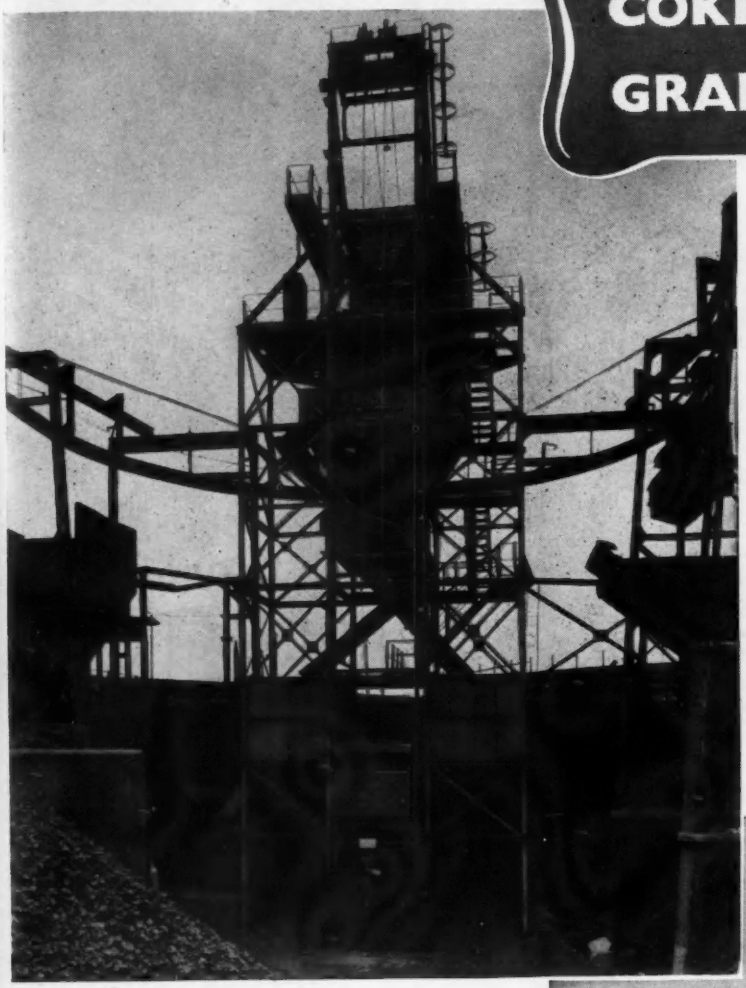
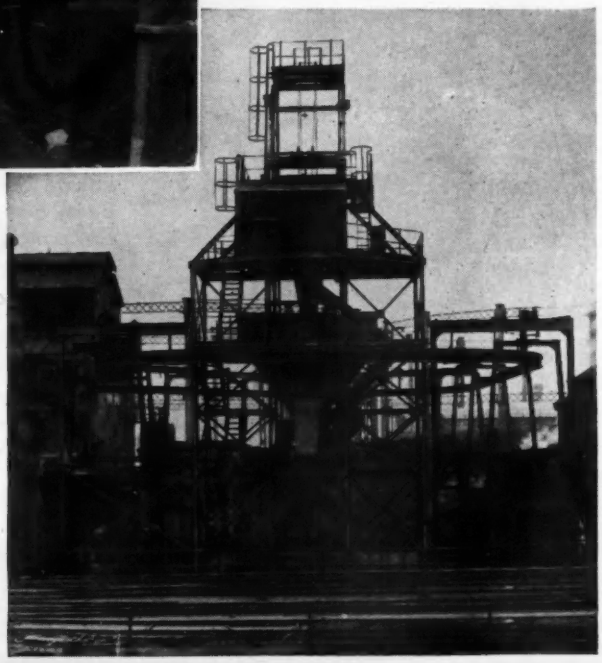
COKE HANDLING AND GRADING PLANT



COMPLETE coke handling and grading plant for the Northern Gas Board, comprising Skip Hoist, Storage Bunkers, Screens and complete supporting structure, dealing with 20 tons per hour. The Skip Hoist is of the unbalanced semi-automatic type with 18 cwt. capacity, lifting speed 80 ft. per min.

Vibratory Screens include primary screen grading coke 1½ in. and under and a secondary screen grading 1½ in.-⅜ in. size and ⅜ in. and under. Bunkers include one 9½ tons capacity with chute loading direct to rail wagons, and two bunkers each 8 tons capacity with chutes for road wagon loading. All Bunkers are Gunite lined. The plant is complete with all electrical equipment and motors. Total height of structure 81 ft. above ground level.



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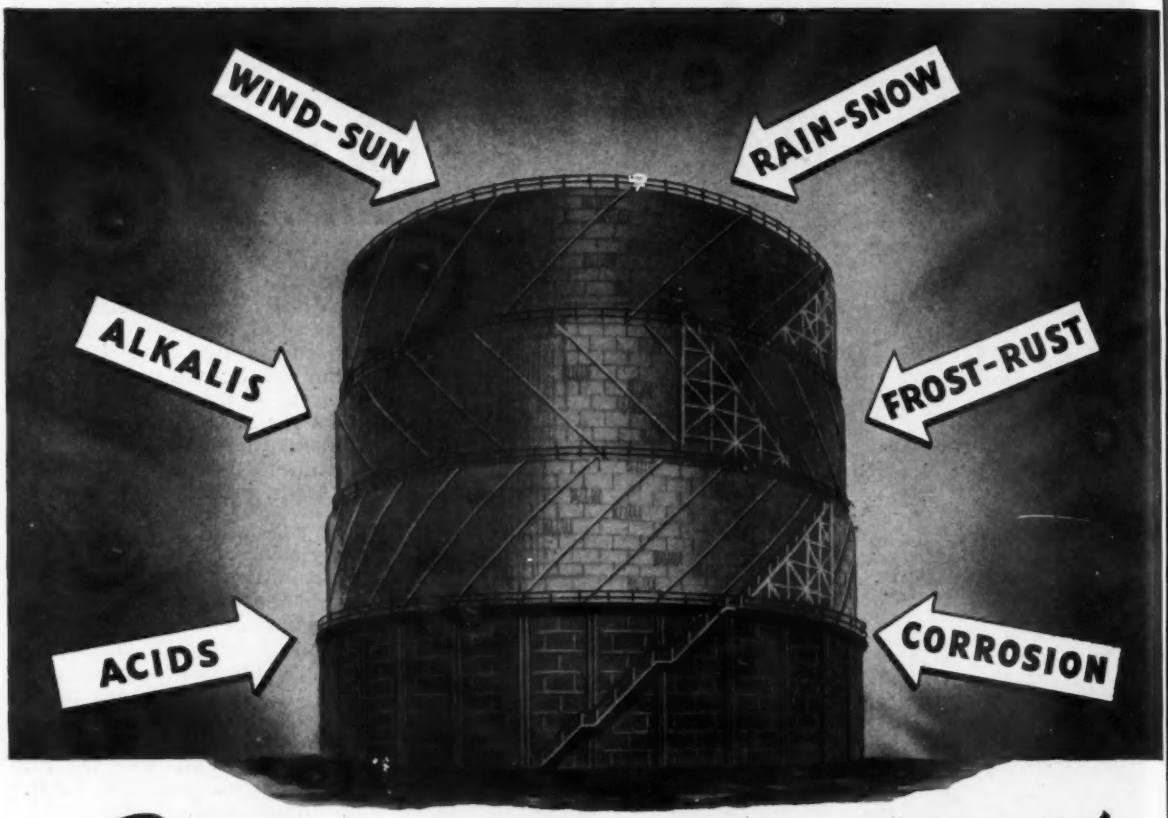

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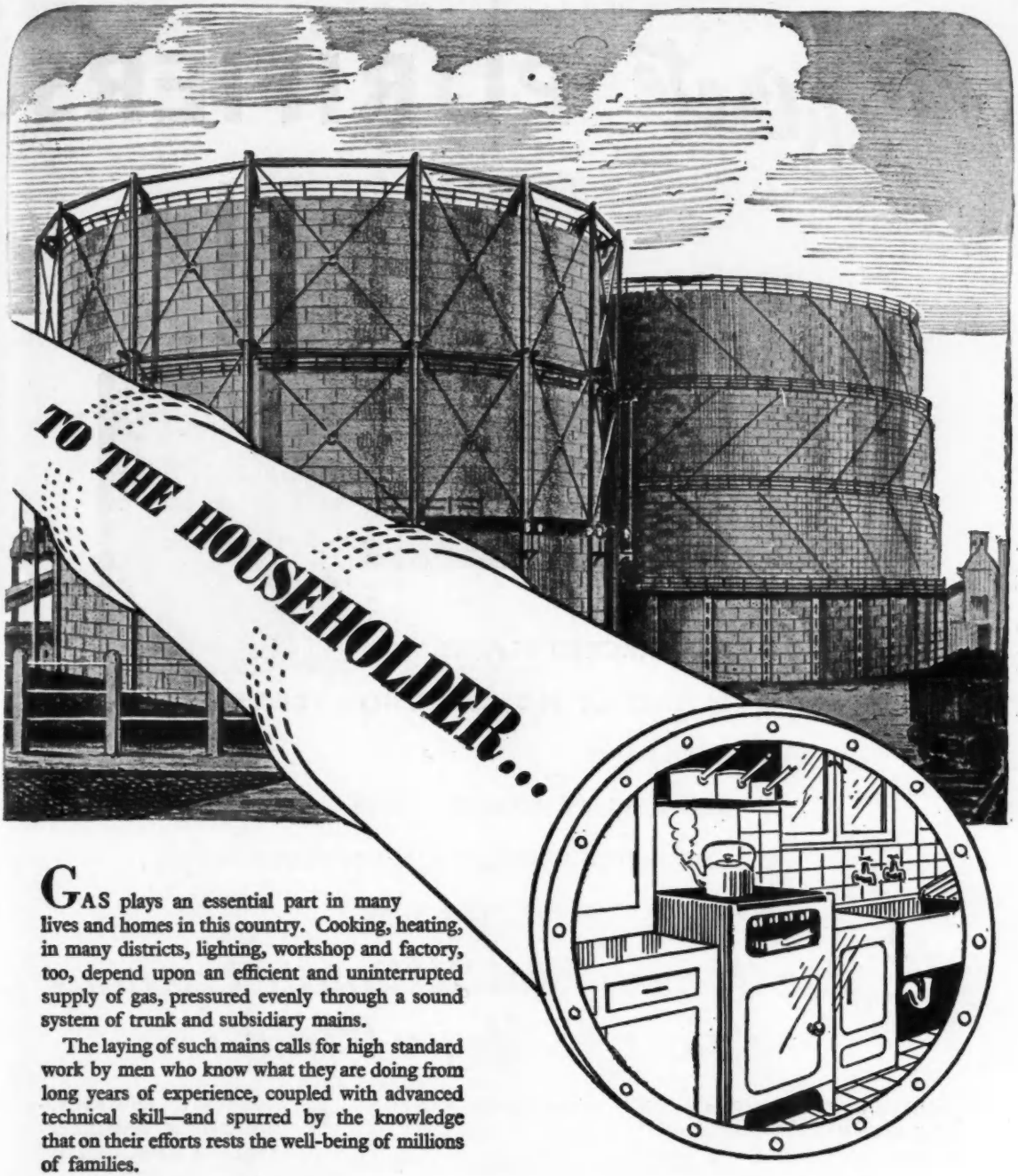
. . . from the holder



GAS plays an essential part in many lives and homes in this country. Cooking, heating, in many districts, lighting, workshop and factory, too, depend upon an efficient and uninterrupted supply of gas, pressured evenly through a sound system of trunk and subsidiary mains.

The laying of such mains calls for high standard work by men who know what they are doing from long years of experience, coupled with advanced technical skill—and spurred by the knowledge that on their efforts rests the well-being of millions of families.

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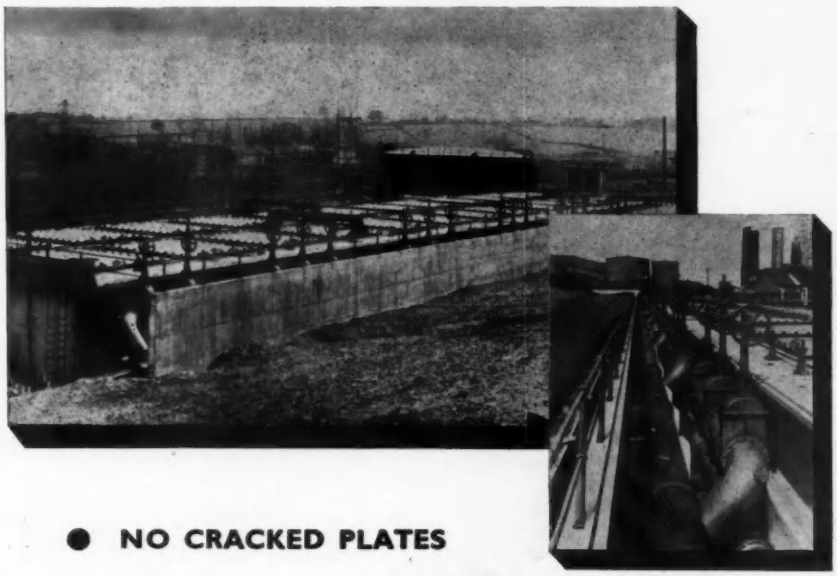

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In tackling any job, the quicker one gets to grips with the problem the quicker the job is done.

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You can also get to grips with the problem of obtaining the right tools and equipment easily . . . we carry a complete range for the needs of the Gas Industry.

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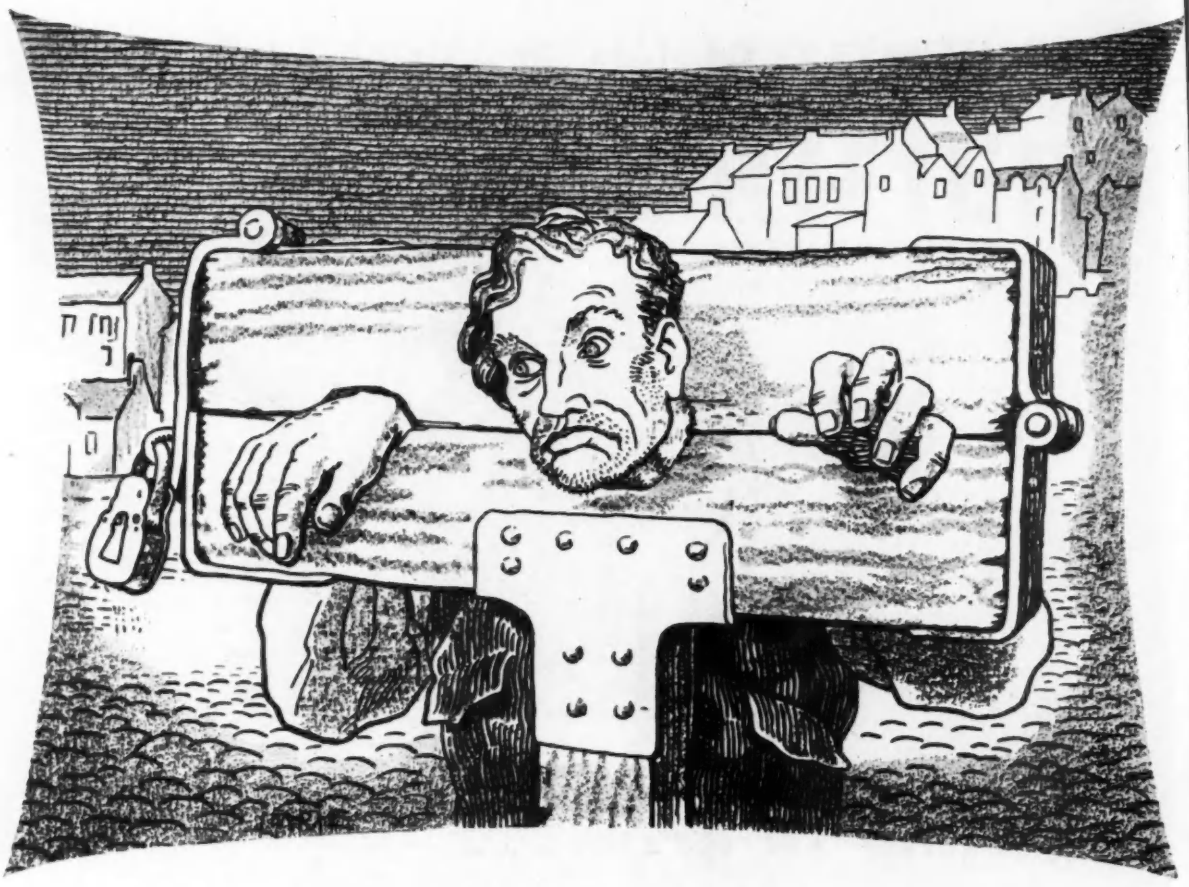

UNDER CONTROL

Old time methods of control, particularly of malefactors, were often harsh and ill-considered. But Peebles controls, though positive and responsive, are smooth and carefully thought out in every detail. Peebles are **best** for Governors.

Peebles

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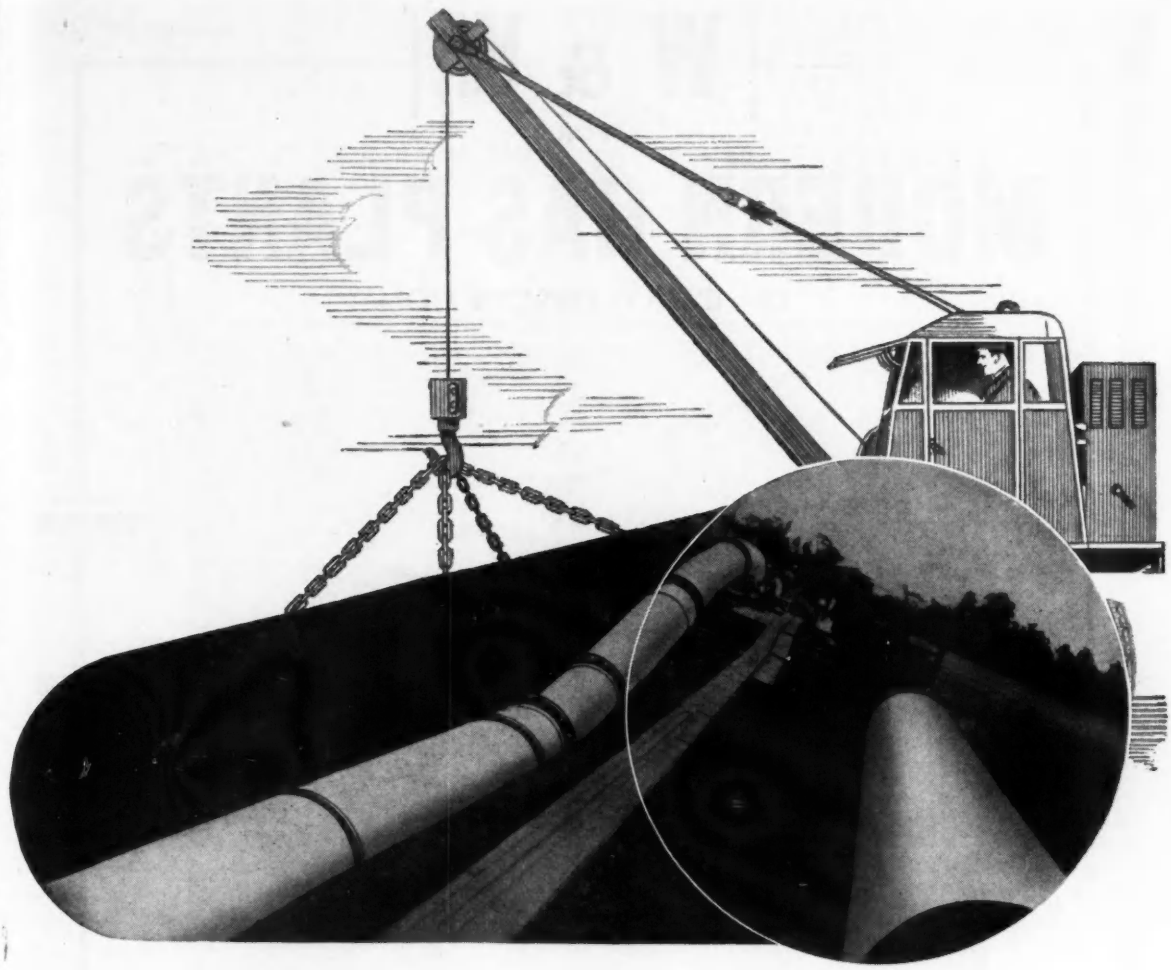

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The strength and comparative lightness of the large diameter steel pipe coupled with its sectional length of twenty-five feet means faster laying, fewer joints and no breakage risks—practical and economical progress. Other equally important features of these pipes are illustrated in our Catalogue S.P. 40.

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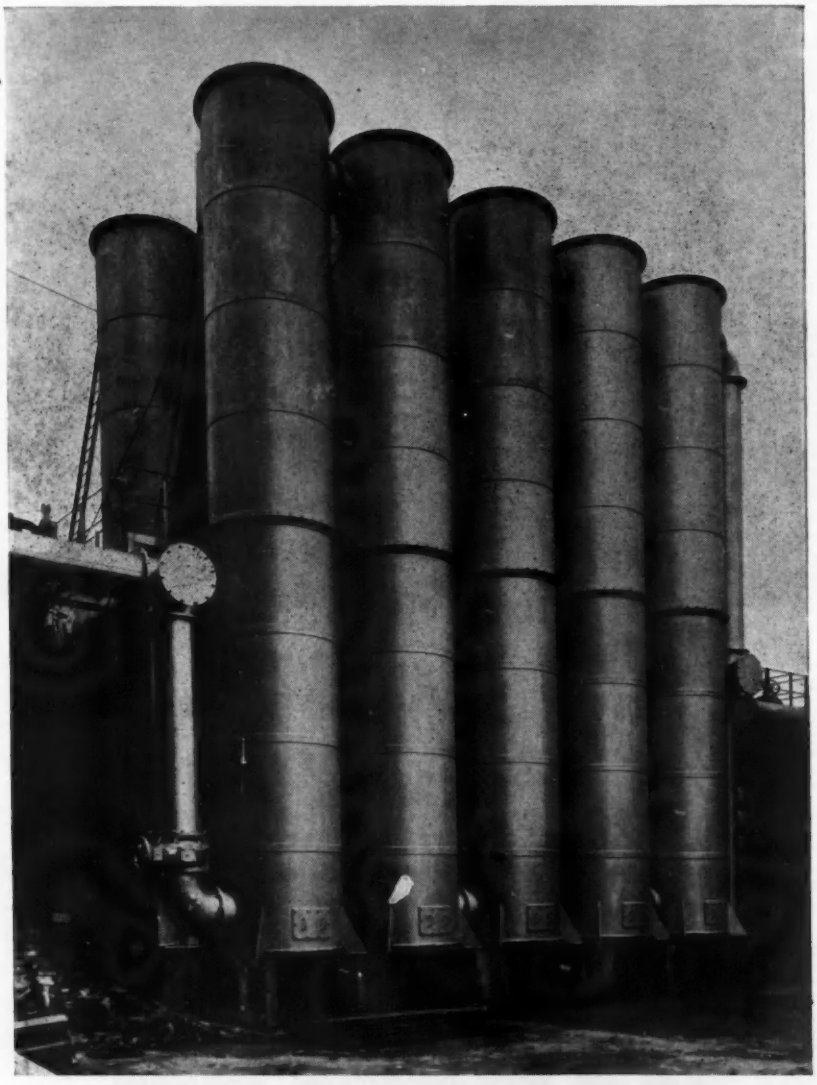

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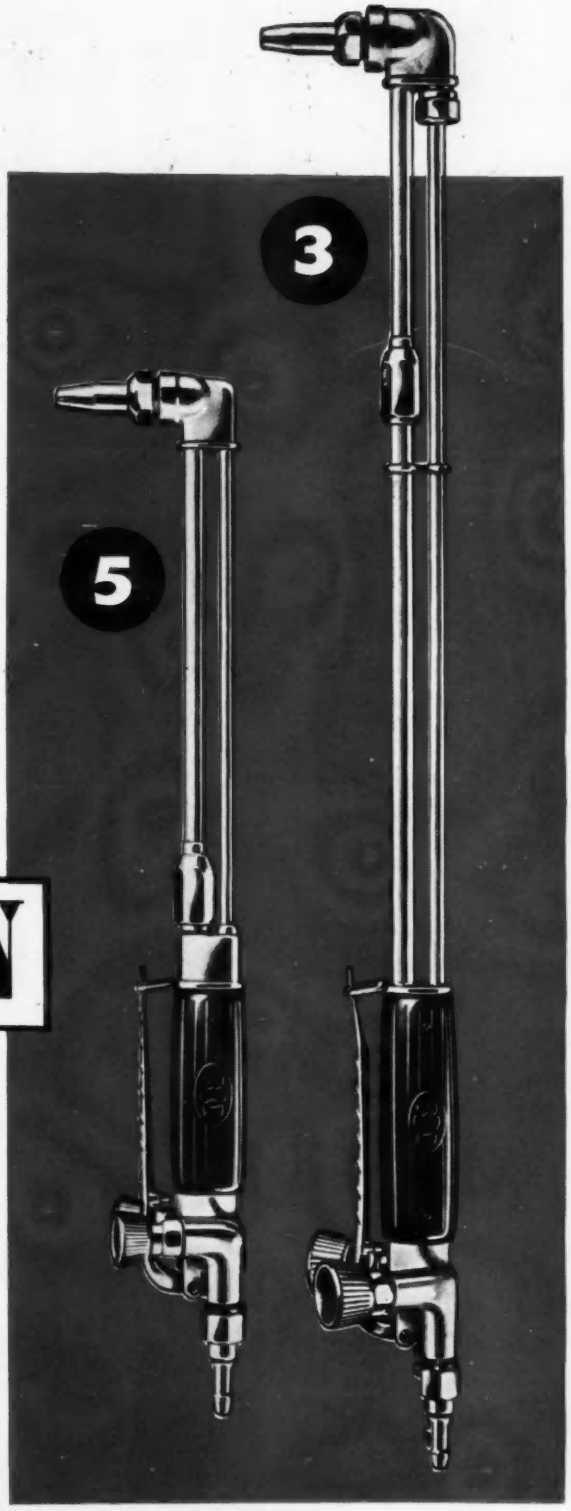

Cutogen 5

1 A robust Cutter. Cuts 12 ins. mild steel and 4 in. cast iron.
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3 Lever cutting control "off" when released.
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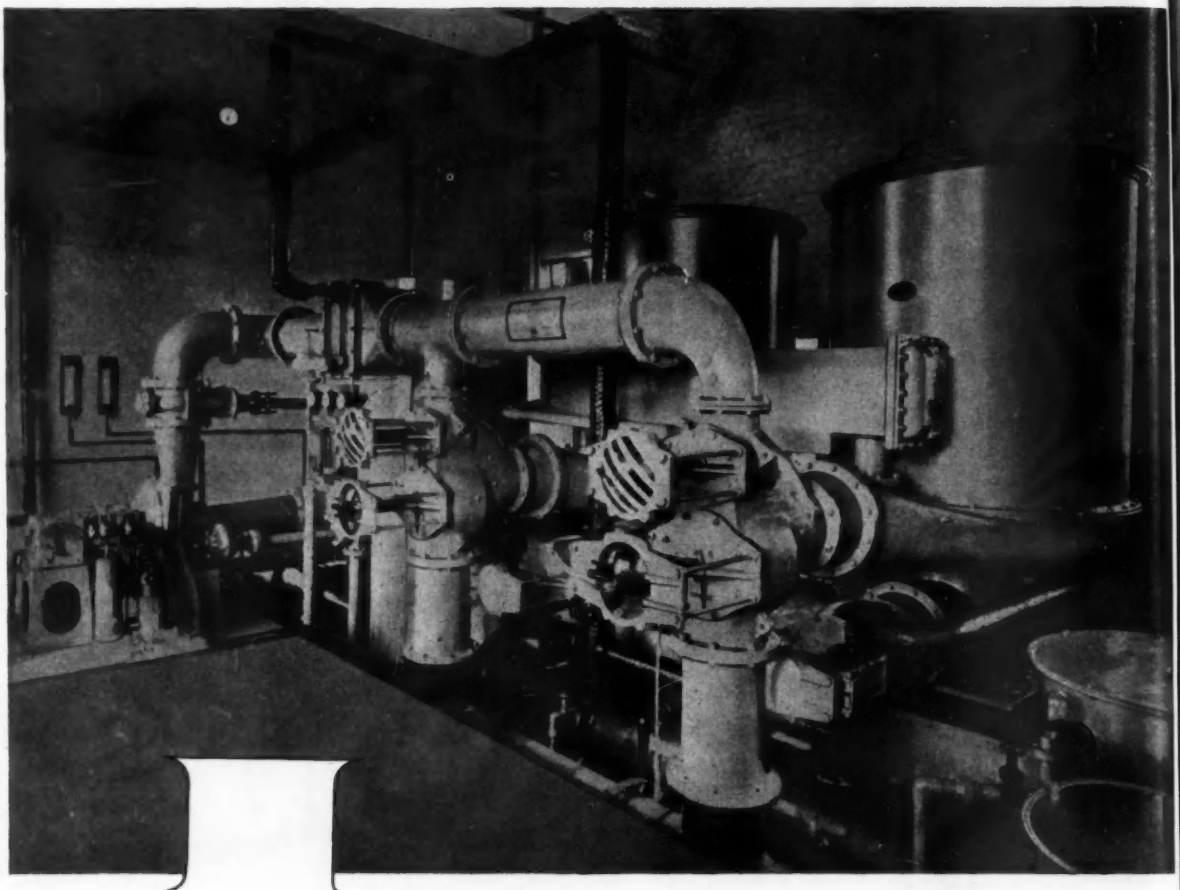

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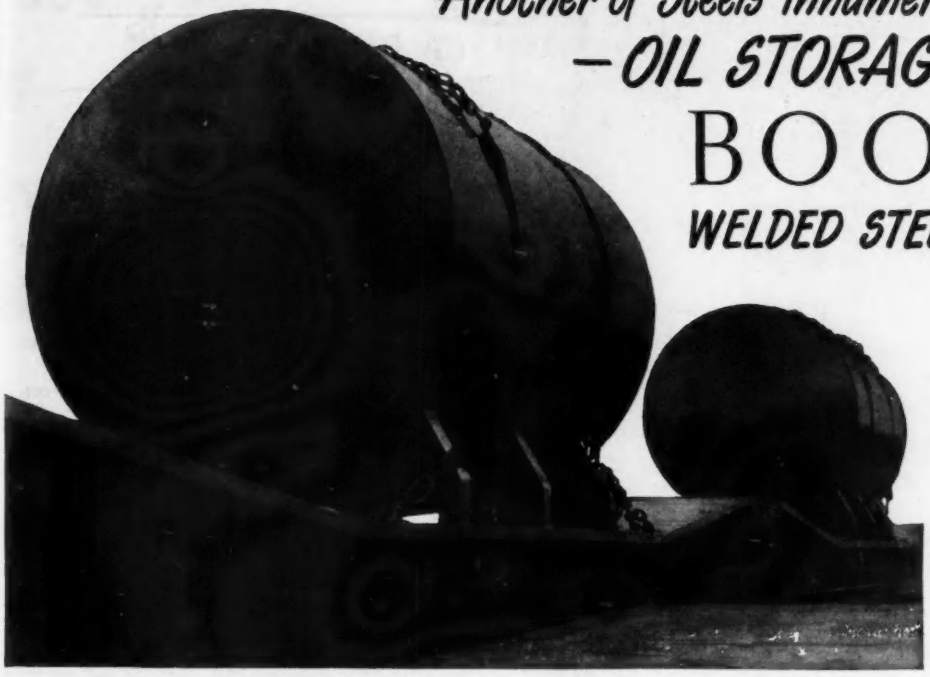

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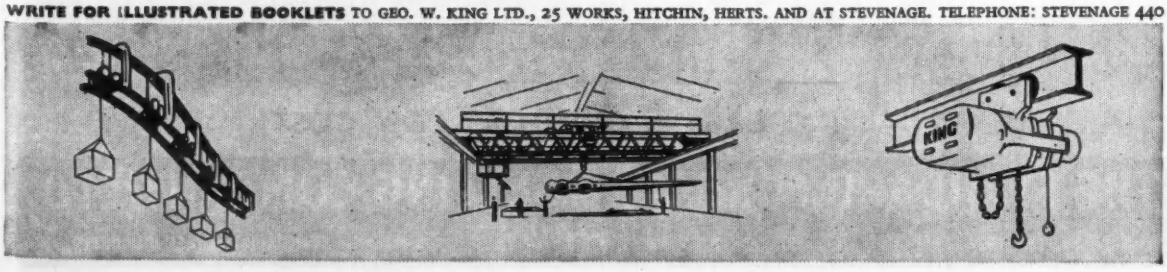

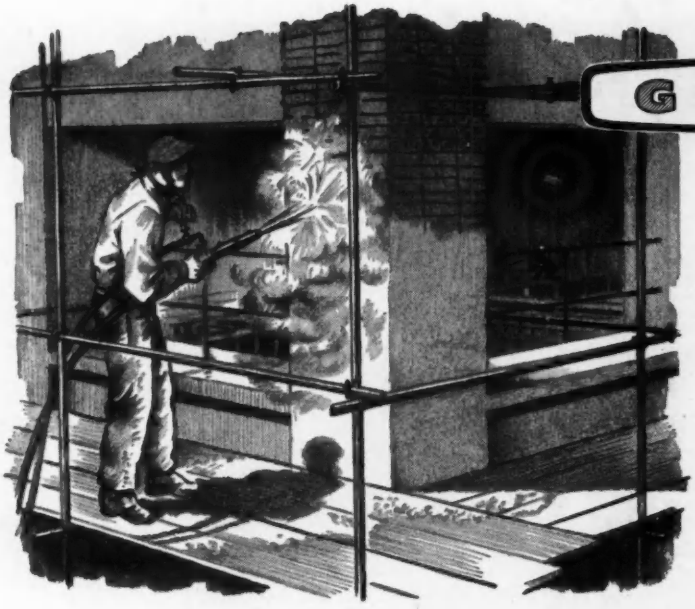

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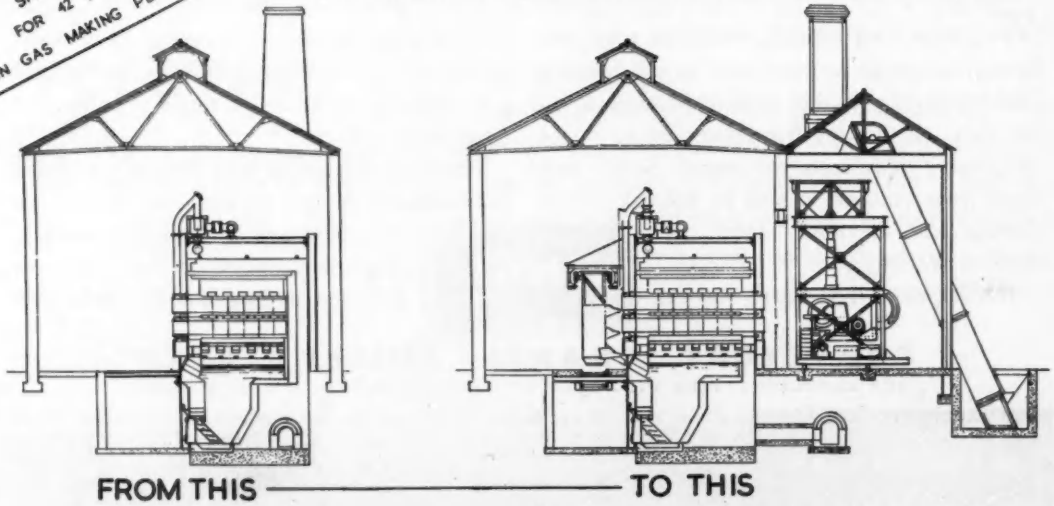

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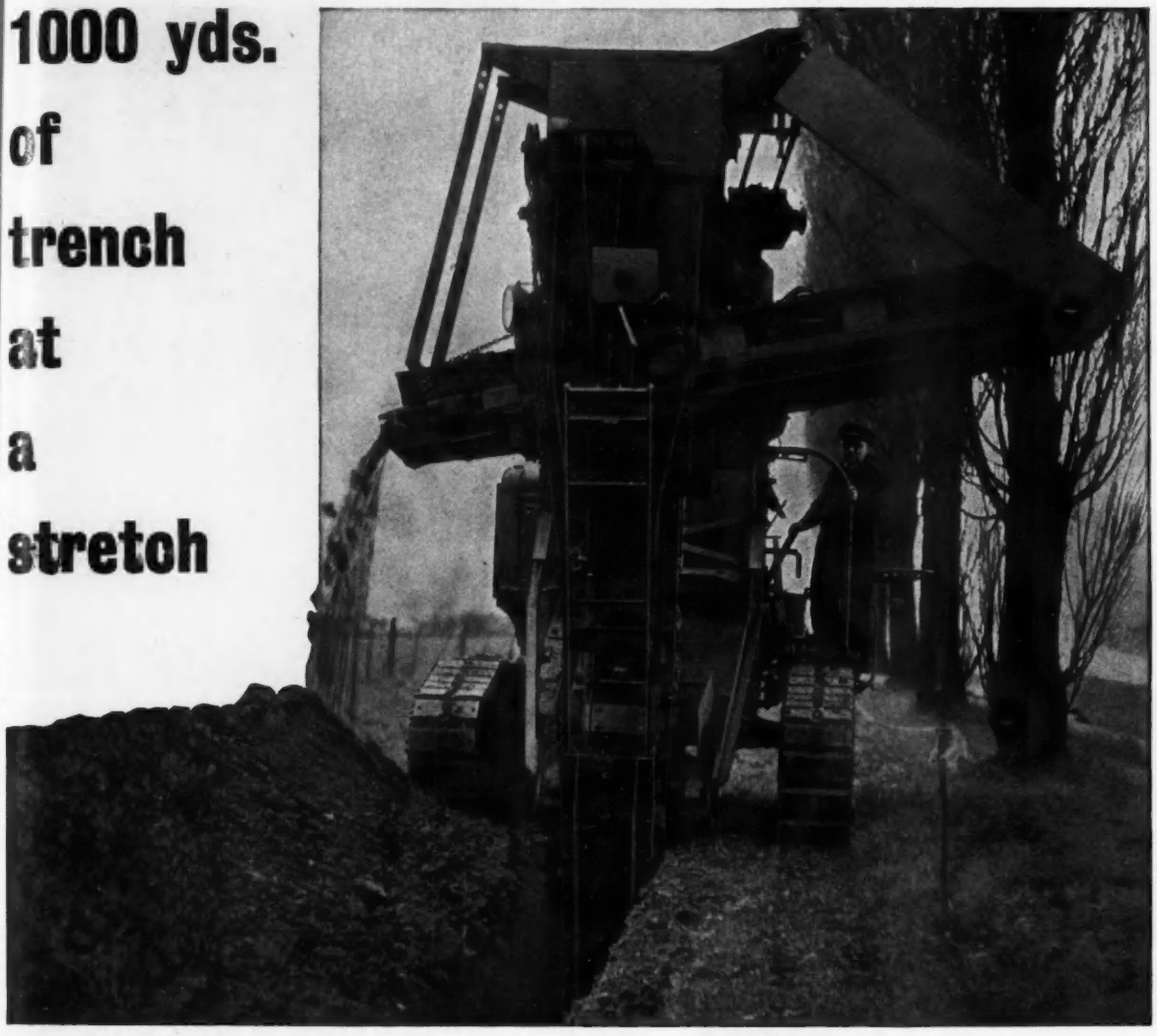

The 44c Ditcher shown above is working on the Barnet by-pass, excavating a trench for the Eastern Gas Board. **Fast and Manoeuvrable,** the Ditcher cuts trenches 18", 21" and 24" wide to a maximum depth of 8' 3". **The Vertical Boom** leaves no ramp to be excavated by hand; it also allows the Ditcher to cut round corners, still keeping the boom at the required depth. An exclusive **Automatic Overload Release** protects the machine against underground obstructions and can be set to prevent damage to pipes and cables. **Operated by One Man,** the 44c Ditcher with its fast "milling action" reduces trenching costs to a minimum.

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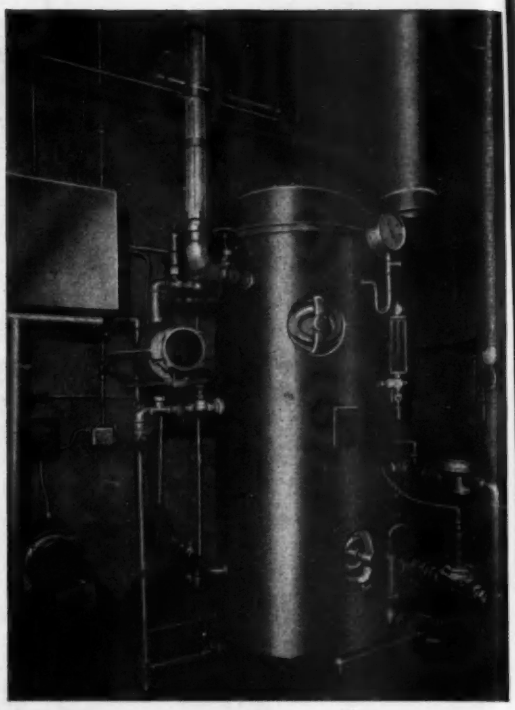

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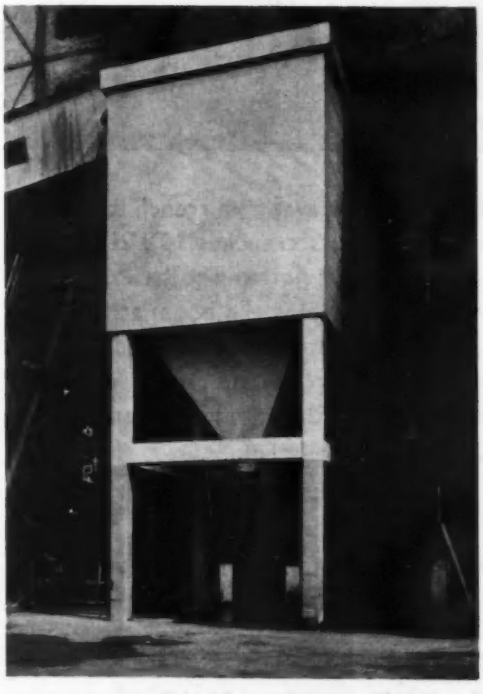

Ash plant bunker at North Thames Gas Board, Nine Elms Gas Works, Nine Elms Lane, London, S.W.8. Bunker protected with Inertol Enamel "B" Cream.

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The action of the machine is straightforward : coke is fed into a top hopper, passed through on to a debreezing screen, and fed to a small buffer hopper supplying coke to a weighing hopper via a vibrator feeder.

At a pre-set weight the weighing hopper drops, switching off a mercury switch, so stopping the vibrator feeder: the debreezing screen meanwhile still feeds coke into the small buffer hopper, which, under normal circumstances would ultimately overflow. "Noflote" Control, however, regulates this screening and so maintains the quantity of coke in the small buffer hopper between two predetermined levels.

The level of the electrode is so arranged as to keep a sufficient supply of coke for the weigher until a fresh supply is delivered from the debreezing screen. When the level of the coke reaches the upper electrode this screen is automatically stopped; it restarts when the level descends clear of the lower electrode.

For further details of the varied applications of "Noflote" Controls, ask for publications G.J. 234.

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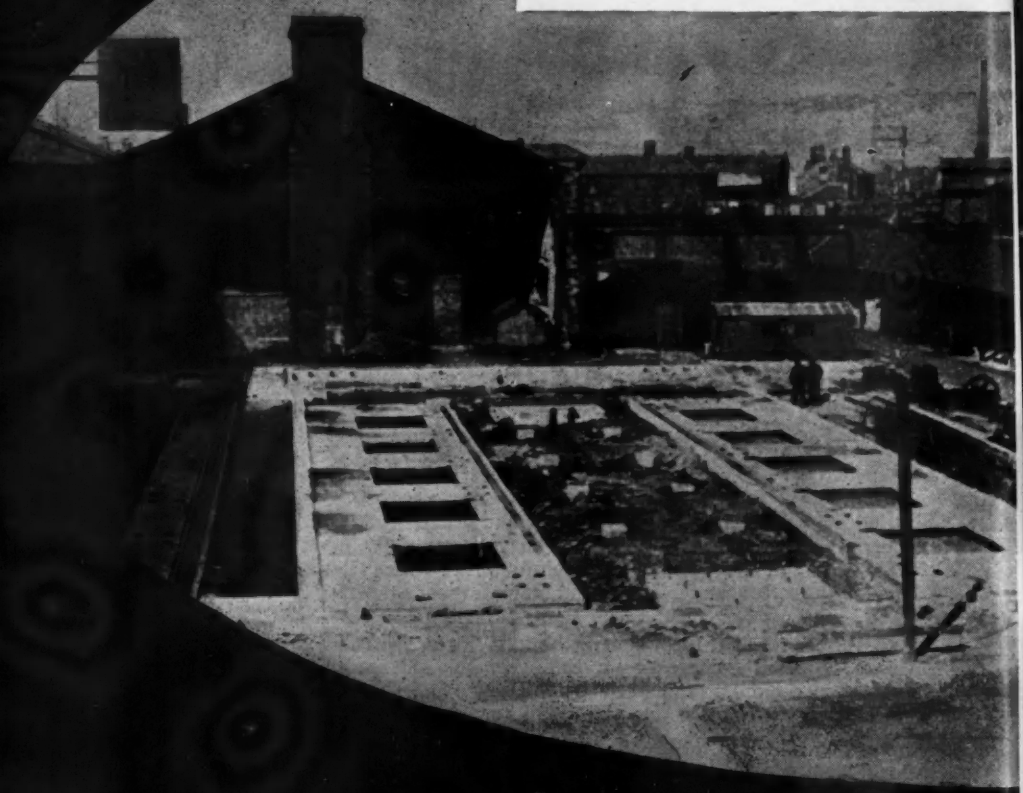

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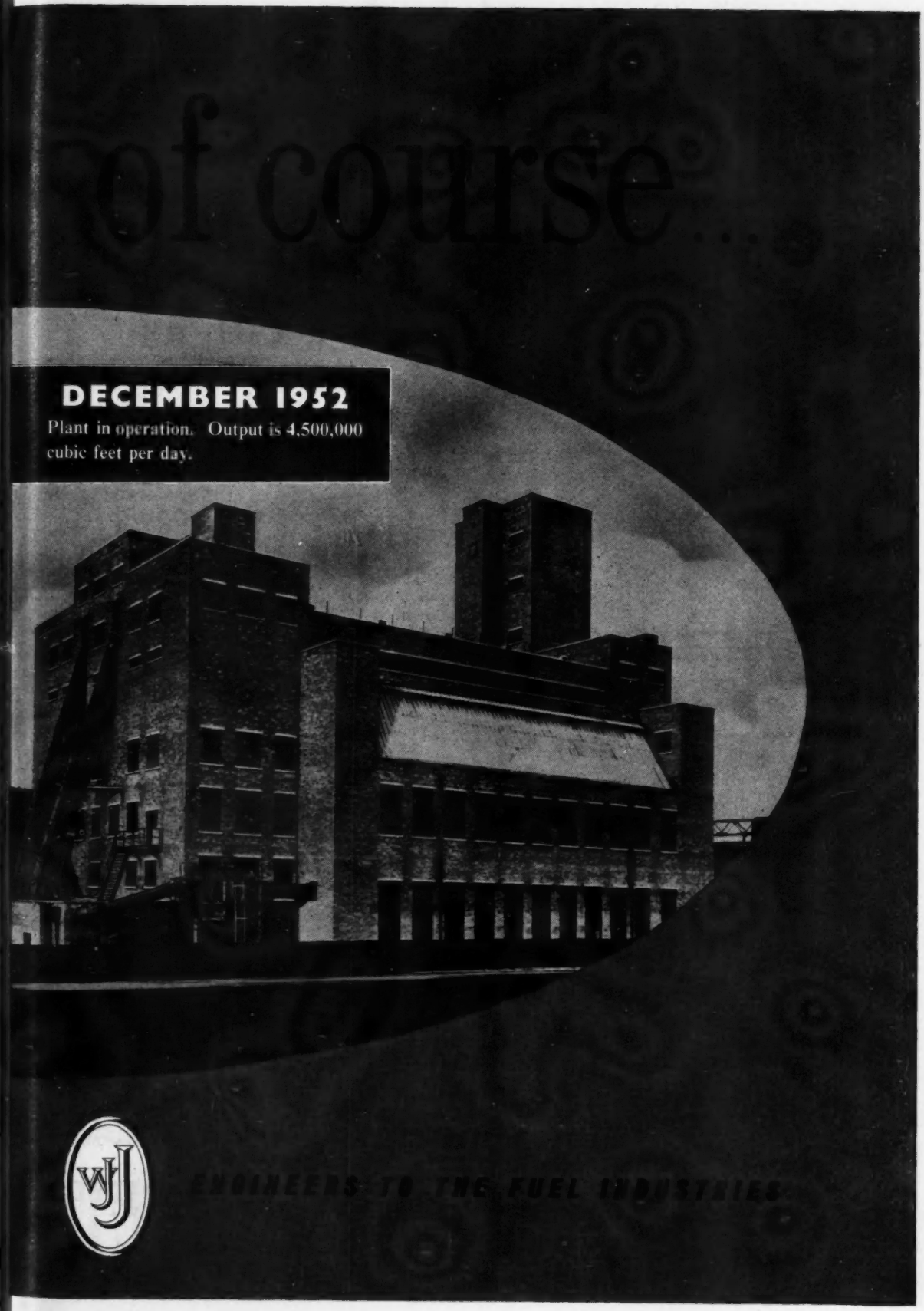
W. J. JENKINS & CO. LTD., Retford, Notts. *Tel: Retford 131.* London Office: 28 Victoria St., S.W.1. *Tel: ABBey 1778.*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Plant in operation. Output is 4,500,000 cubic feet per day.
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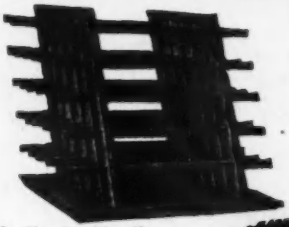

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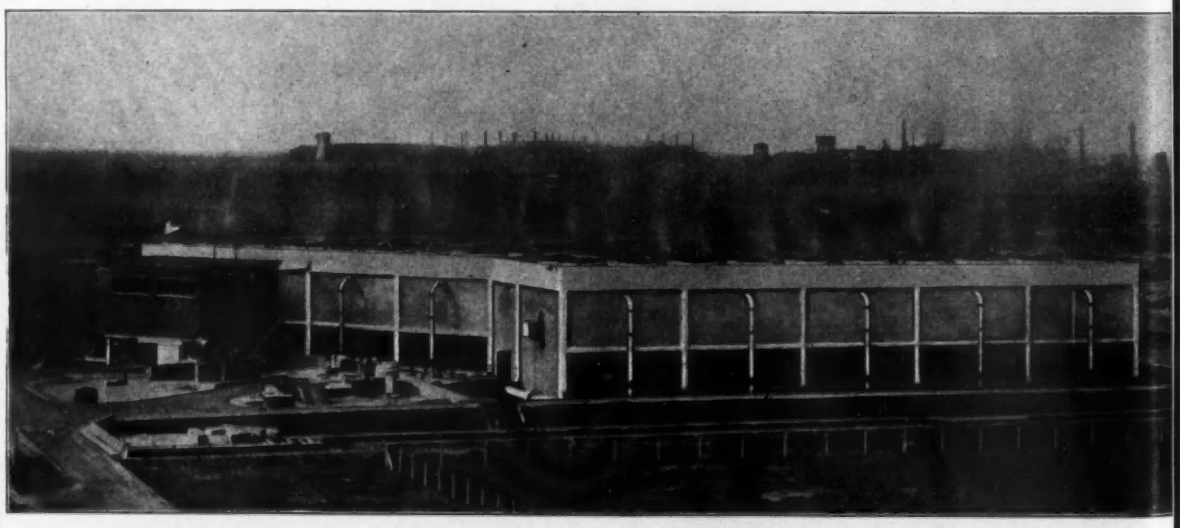

THE ABOVE ILLUSTRATION DEPICTS A WATER COOLING TOWER INSTALLATION OF THE MECHANICAL INDUCED DRAUGHT TYPE. TO ACHIEVE THE VERY EXACTING DUTY SPECIFIED A TOTAL OF 36 FANS ARE EMPLOYED WHICH ARE SITUATED IN THE ROOFS OF THE TOWERS. THE INTERNAL FILLING IS EXCEPTIONALLY COMPACT, CONTAINS THE LATEST IMPROVEMENTS AND IS SO DESIGNED TO MINIMISE OPERATIONAL COSTS. IN THE BACKGROUND TOWARDS THE LEFT CAN BE SEEN A 160 FEET HIGH NATURAL DRAUGHT HYPERBOLIC TOWER FOR A SERVICE REQUIRING A LESS STRINGENT PERFORMANCE.

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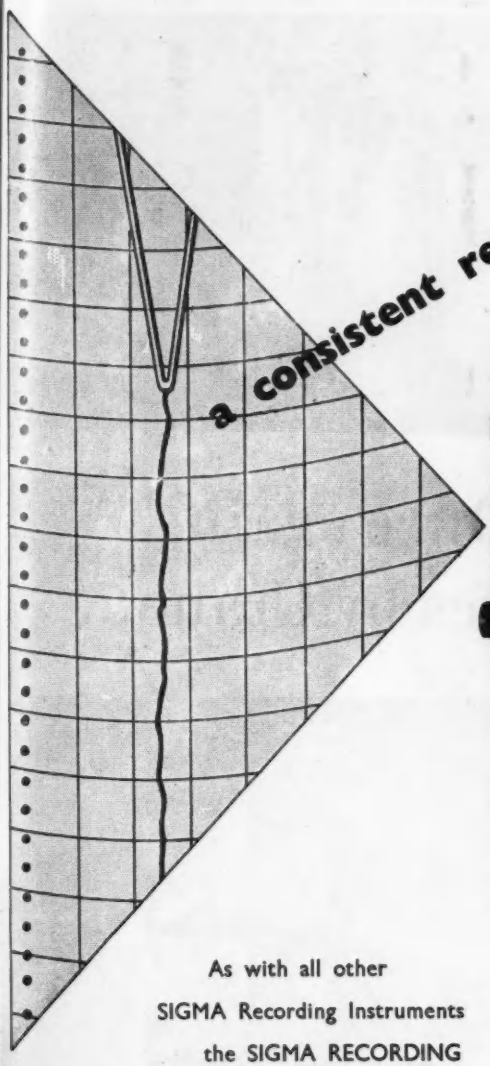

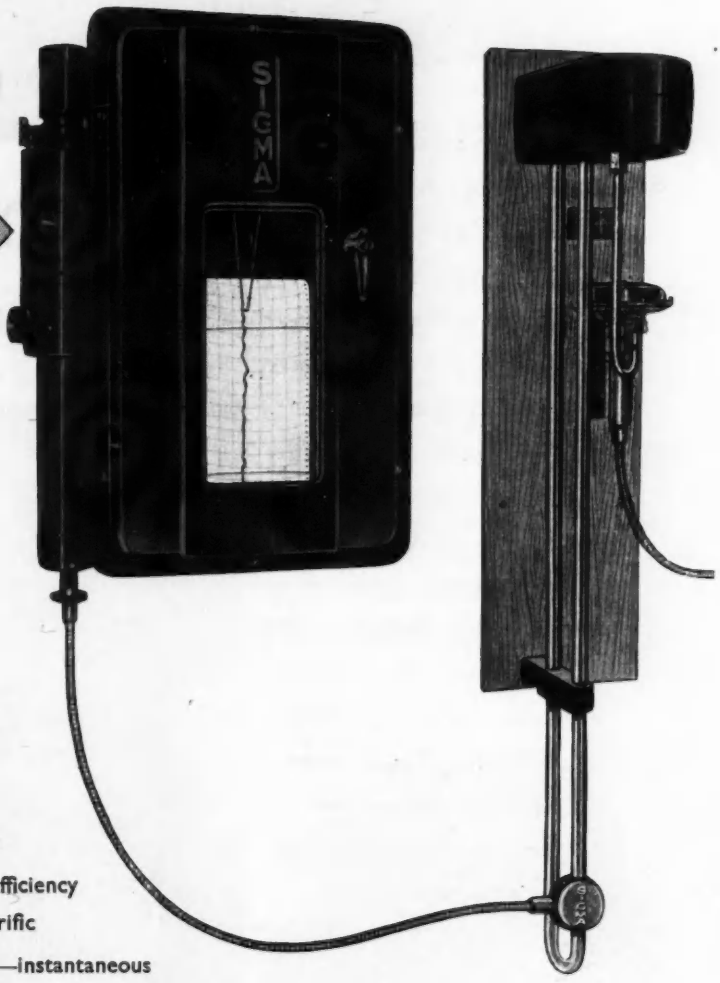

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We shall be pleased to send you full information of the SIGMA range of recording instruments

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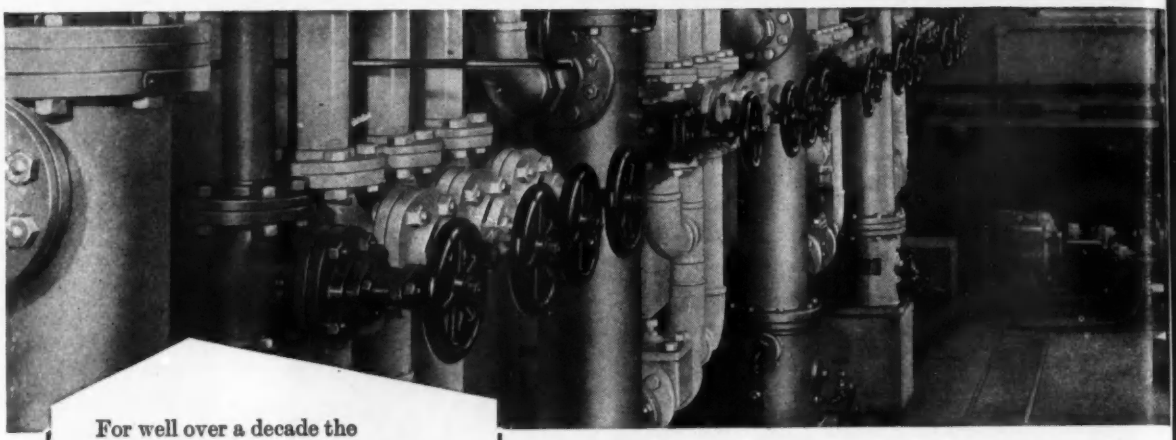

For well over a decade the original Crane valves installed in the Harrow factory of Kodak Ltd. have been giving efficient, trouble-free service. Performances like this, in works all over the country, have given Crane its great reputation for absolutely reliable valves. This reputation is based on Crane's high standards of design and manufacture—raw materials chosen to rigid specifications, precision methods of production, exacting tests of finished valves. Manufacturers and engineers, who base their judgment on results, specify Crane for the finest in valves.

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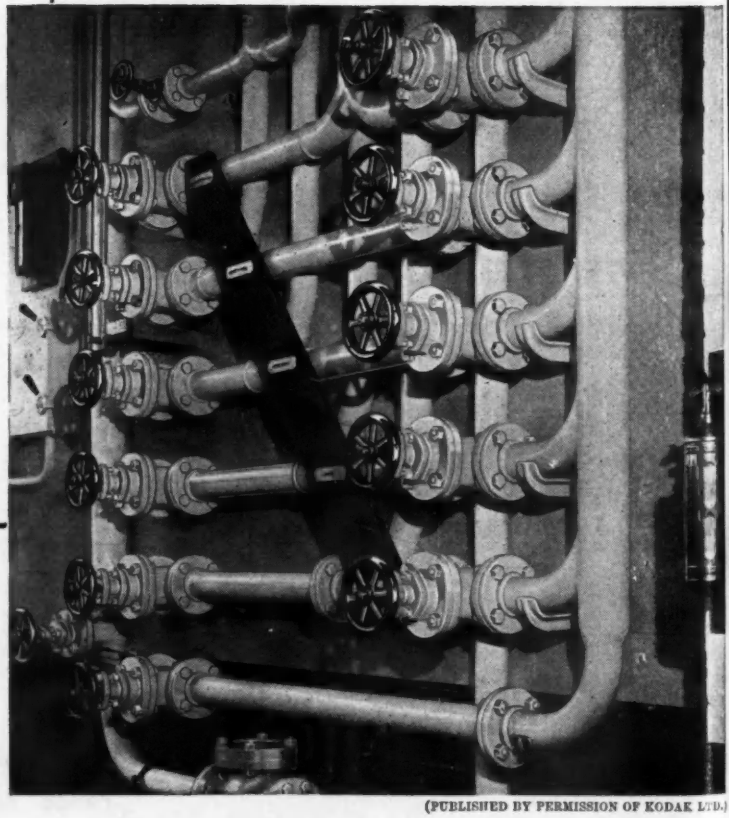

The illustrations show the Crane valves installed in the Main Compressor House of the Kodak Harrow factory.

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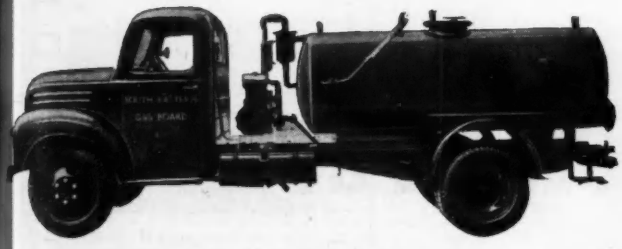
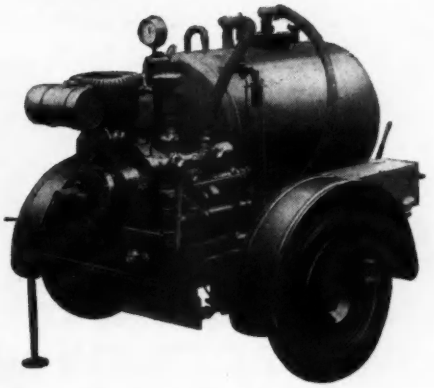


SYPHON EMPTYING OUTFIT

The vacuum syphon emptying outfit illustrated is mounted on a 4-ton Fordson chassis. A 600 gallon galvanised tank is fitted. A rotary type exhauster is driven by a 4 h.p. four-stroke air cooled engine, mounted on a sub-frame behind the cab. The tank is fitted with a flame-proof vent and the outfit can be used for high or low pressure syphon emptying. A large manhole at the rear allows the tank to be cleaned easily.

A sight glass is fitted to enable the operator to know when the syphon is emptied. Twenty-five feet of 1½ in. suction hose is supplied with the outfit. The outfit can be used for vacuum or pressure working.

Full particulars and illustrated pamphlet sent on request



SERVICE PIPE CLEARING OUTFIT

Trailer model fitted with 75 gallon galvanised tank and a 3 b.h.p. engine driving an exhauster. Vacuum or pressure can be obtained by moving a single lever. Safety valves are employed and come into operation when pressure in the tank reaches 8-10 lbs. The tank is tested to 30 lbs. A 27 in. vacuum is obtained in 2 minutes.

The outfit can also be used for emptying syphons and an automatic liquor valve is fitted to prevent the liquor reaching the exhauster. In addition to the vacuum and pressure gauge a sight gauge is fitted to enable the operator to see at a glance the exact amount of contents in the tank. Sixty feet of 1 in. hose and necessary couplings supplied with each outfit.

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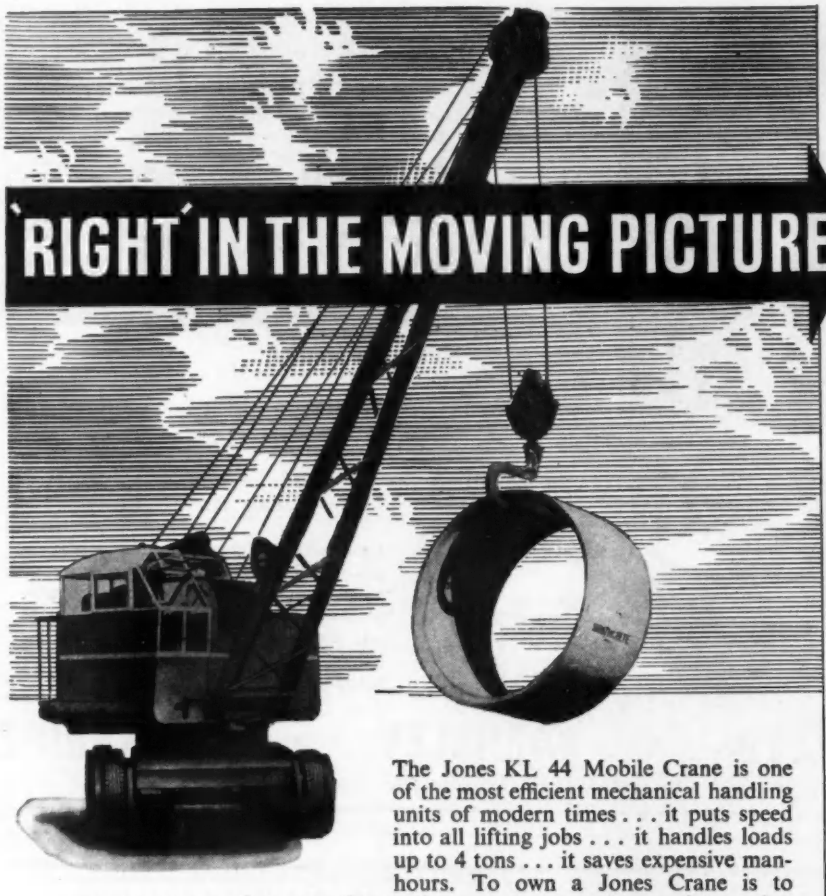

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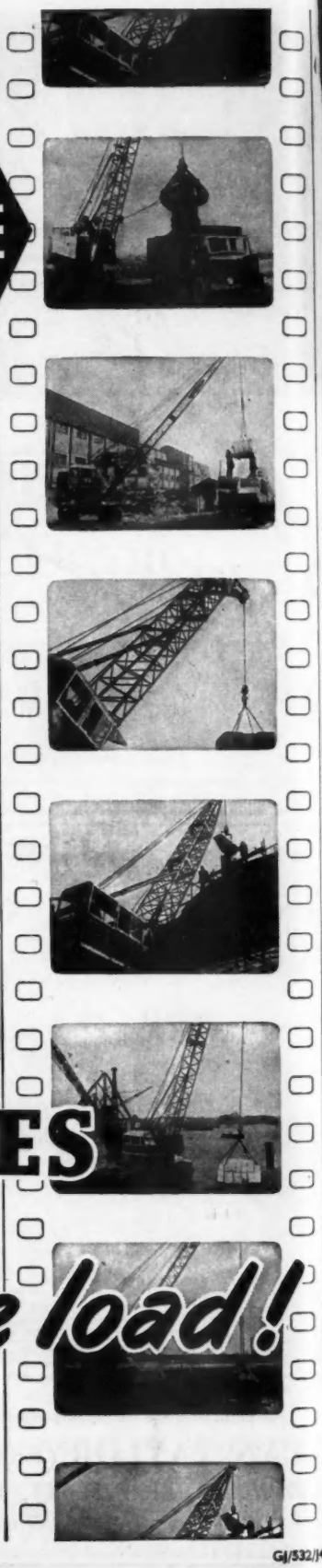

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take the load!

The range includes: **KL 15**—*for loads up to 15 cwt.;* **KL22**—*for loads up to 2 tons;* **KL 44**—*for loads up to 4 tons;* **KL 66**—*for loads up to 6 tons;* **KL 100 Rail Crane**—*for loads up to 5 tons.*

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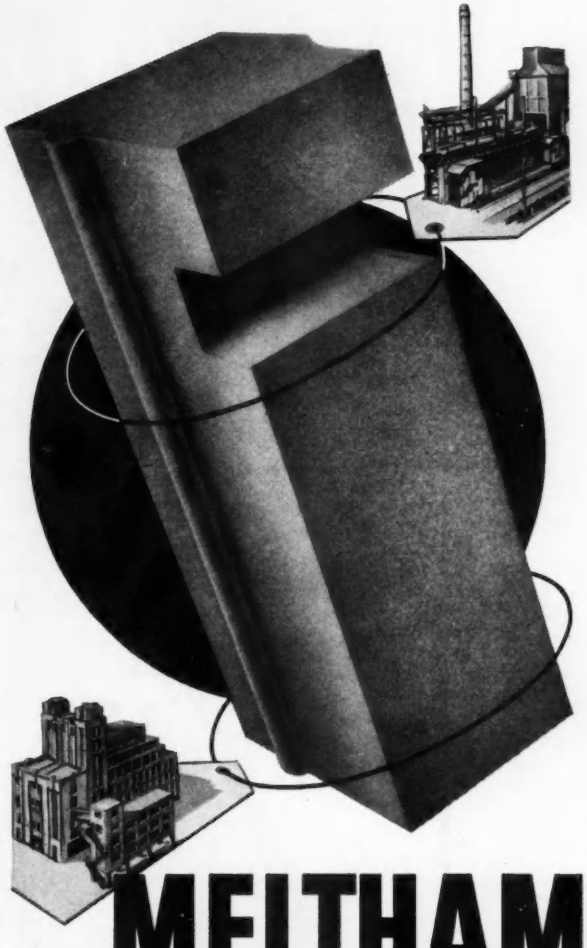

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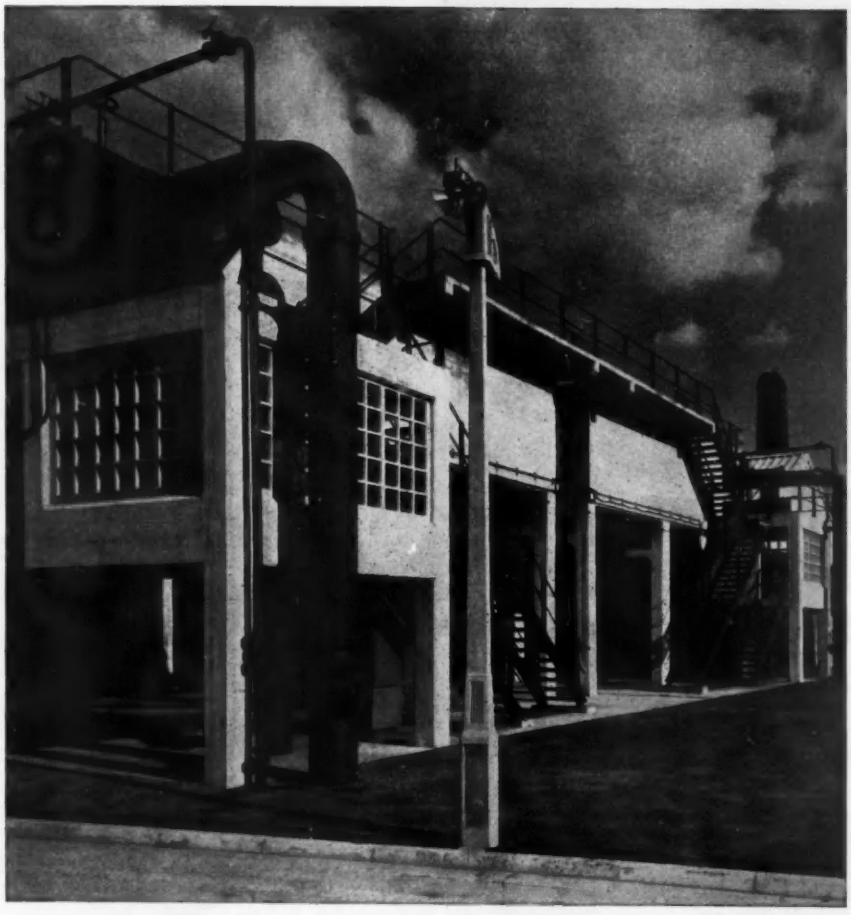

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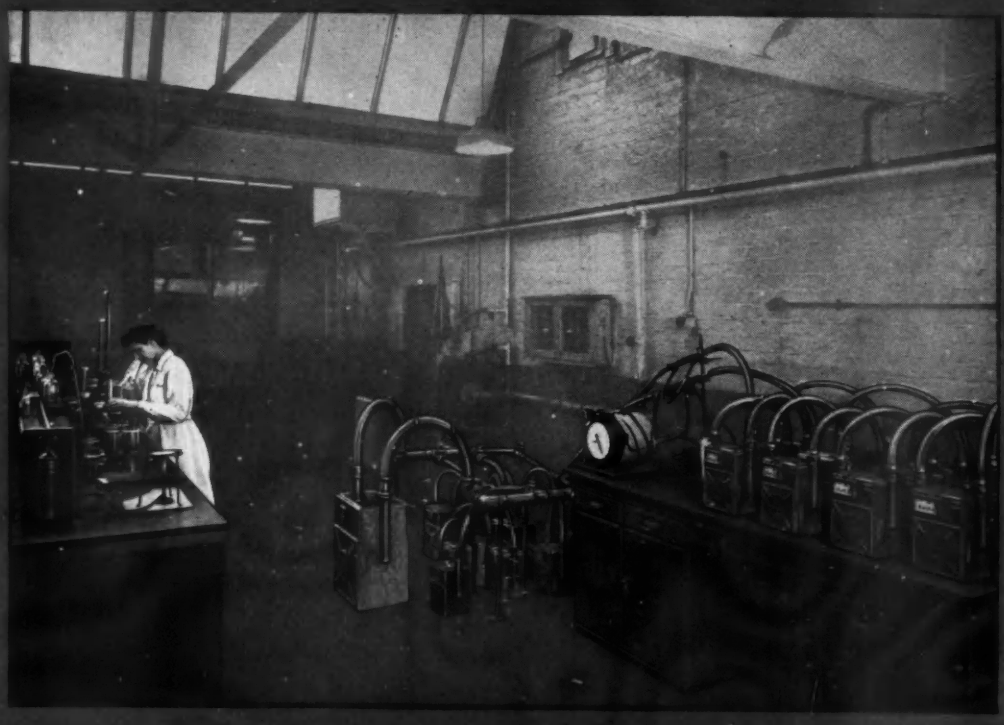

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With the test plant illustrated, gas is passed at varying rates through many meters at one time enabling us to prove design and new materials over a long life term in a comparatively short period.

No change in design or new material is introduced into Parkinson and Cowan meters until proved in accelerated test by the equivalent of at least 20 years' life.

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IN NINE GLORIOUS REIGNS

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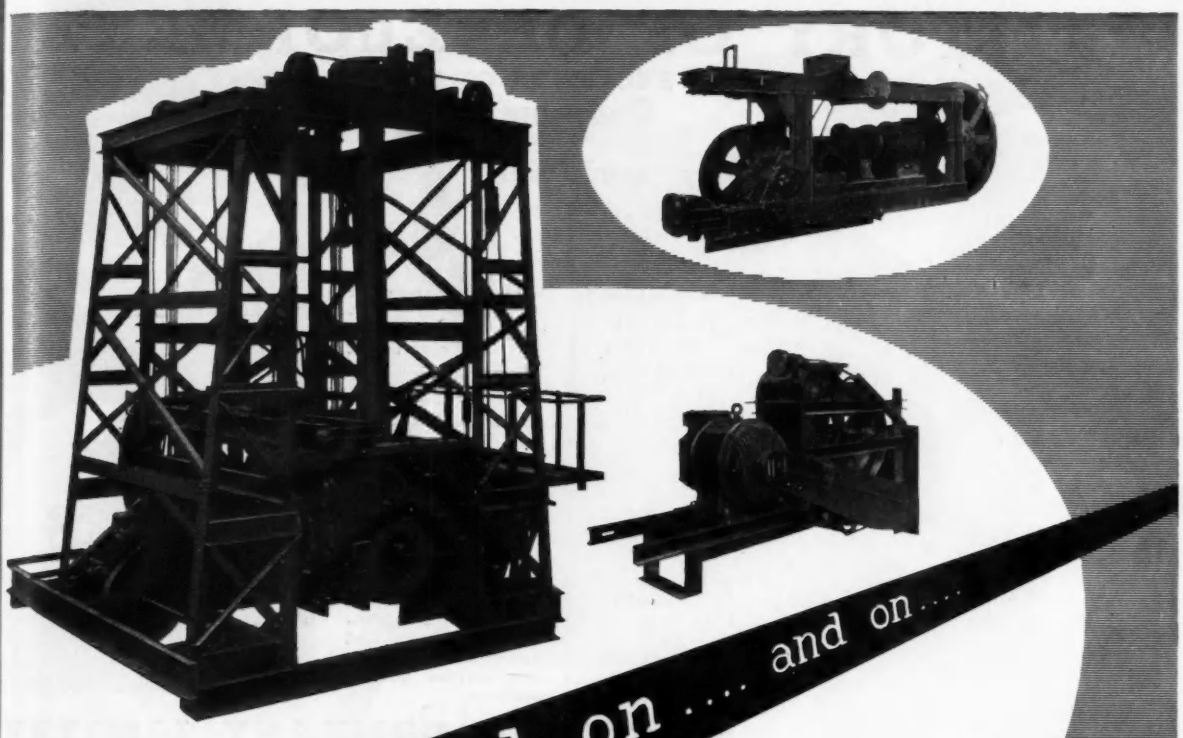

on .... and on .... and on ....

Proof—if proof be needed—of "R & B." leadership in design and construction, is the fact that in several reconstruction schemes, instead of being scrapped, "R. & B." machines have been transferred to other Retort Houses and Works. In one case a machine installed in 1923 was later transferred and is still working; in another a machine installed in 1935 was transferred in 1951.

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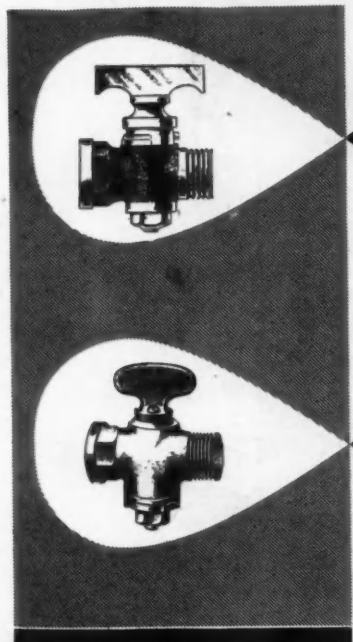
THE EVOLUTION OF THE Spersom MAIN COCK

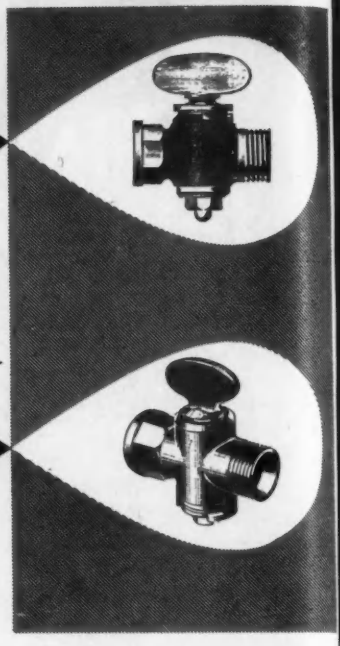


1901

At the Coronation of King Edward VII the "Spersom" Main Cock was 24 years old.

1911

Now ten years older the design is practically the same except for the contour of the Thumb Plug Fan.



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Great advancement has been made and the "Spersom" Main Cock has now self-lubrication and self-adjustment for wear.

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The new "Spersom" Main Cock has lubrication reservoirs and self-adjustment for life long service without attention.

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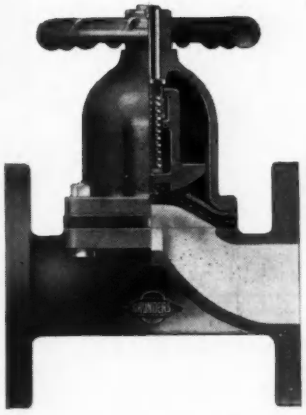

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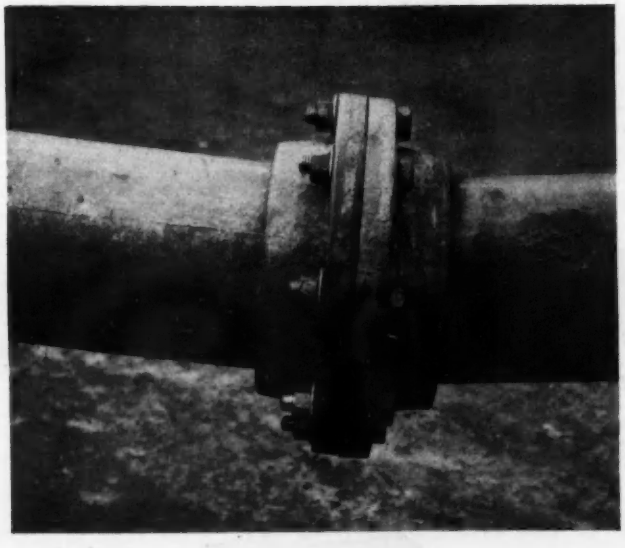

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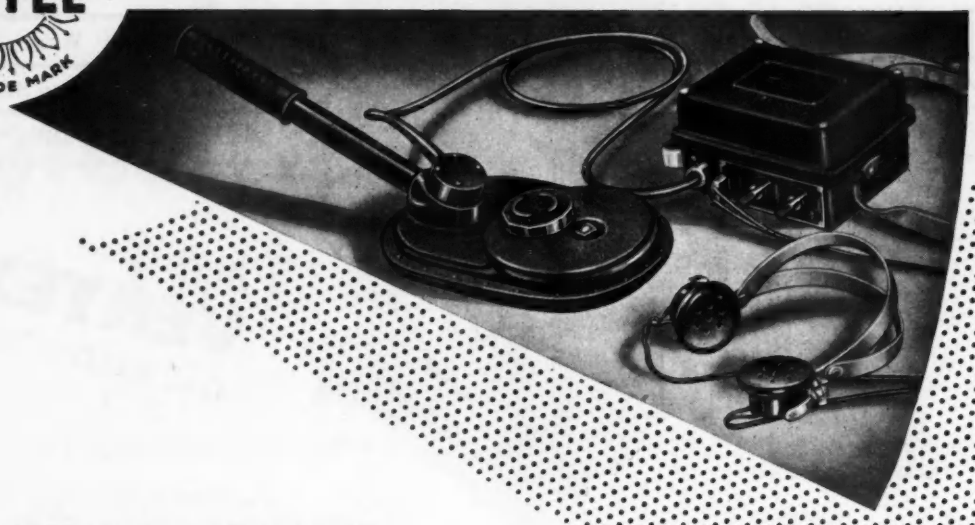

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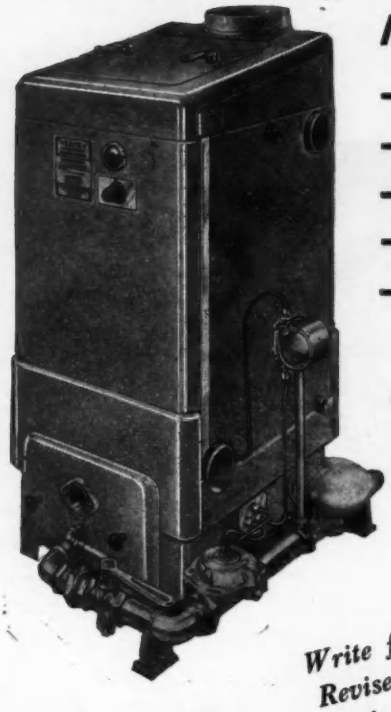
No. 1	80,000	3' 1"	2' 6"	1' 10"
No. 2	160,000	3' 9"	2' 6"	1' 10"
No. 3	200,000	4' 5"	2' 6"	1' 10"
No. 4	300,000	3' 10"	3' 7"	2' 4"



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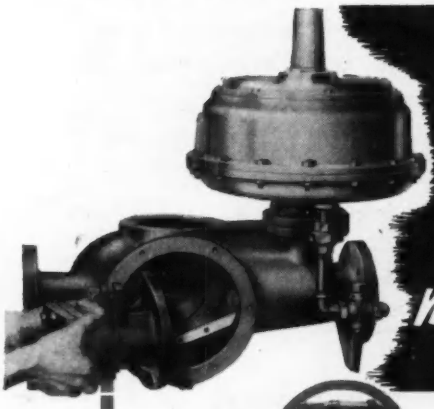

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GOVERNOR..
..lowers maintenance costs!

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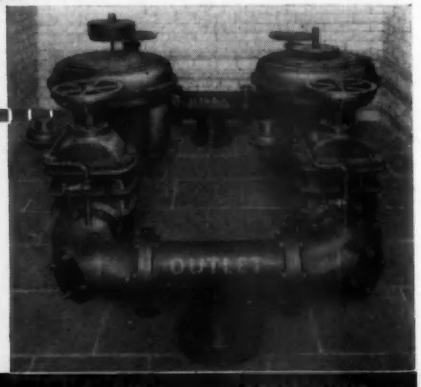

★ See how the COMPLETE Valve Bowl Assembly can be removed to facilitate reconditioning or interchanging with a spare unit without disconnecting from the line.

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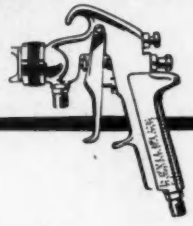
can you trace Defective Spray Finishes to their source?



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★ *The cause of a fluttering spray gun?*
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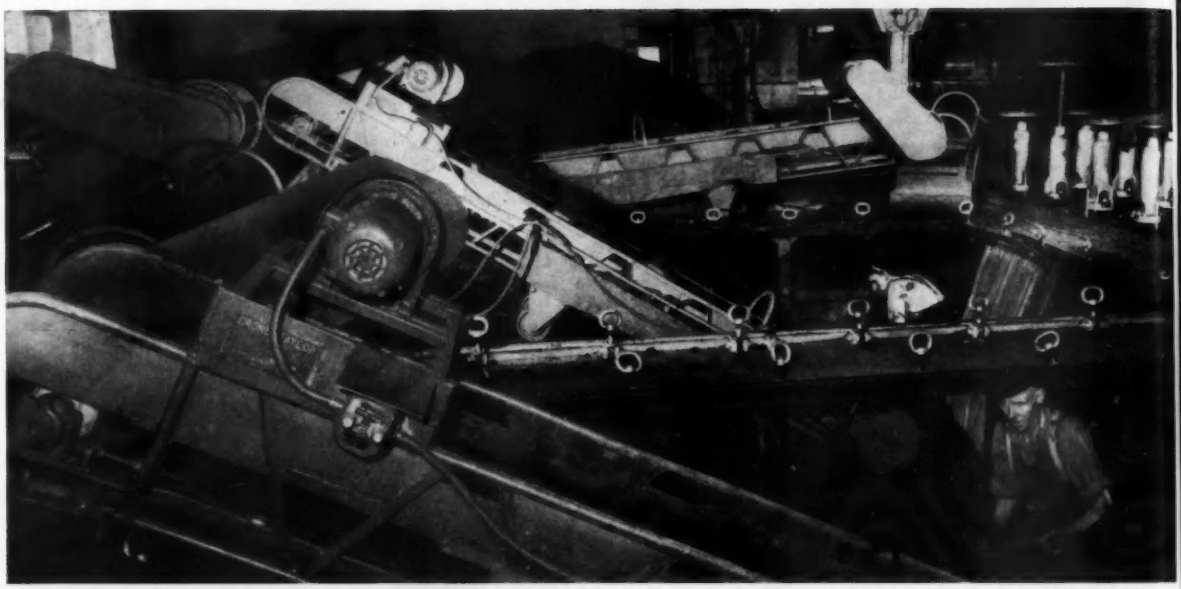

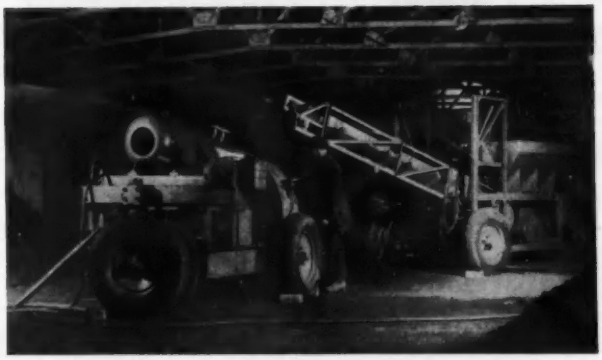

Above (top) is shown a chain of C & T "Foxhound" Conveyors discharging oxide from a purifier box at the Wallasey Gas Works. The smaller photograph above shows an 18 ft. "Foxhound" delivering oxide into a C & T Feed Conveyor which is discharging into a C & T Mobile Oxide Breaker.

A C & T Shuttle Conveyor fed by an overhead skip hoist at the Liverpool Works of the N.W. Gas Board. This machine traverses the whole length of the purifier house, spreading prepared oxide quickly and efficiently over every part of the box.

This report from the Wallasey Works of the North Western Gas Board is typical of the satisfaction expressed by users of C & T Conveyors all over the country. More and more works are installing C & T equipment and many of them are adopting complete C & T handling systems developed by our Engineers after many years of careful study of the requirements of industry and adaptable to almost any plant layout.

CRONE & TAYLOR LTD.

SUTTON OAK, ST. HELENS, LANCS.

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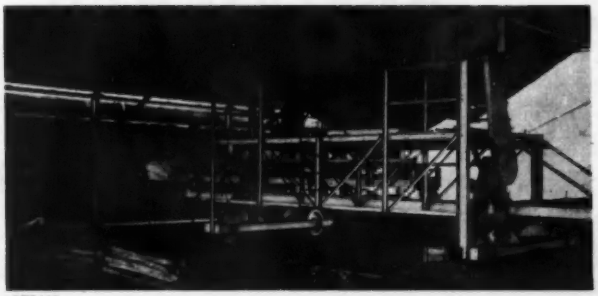

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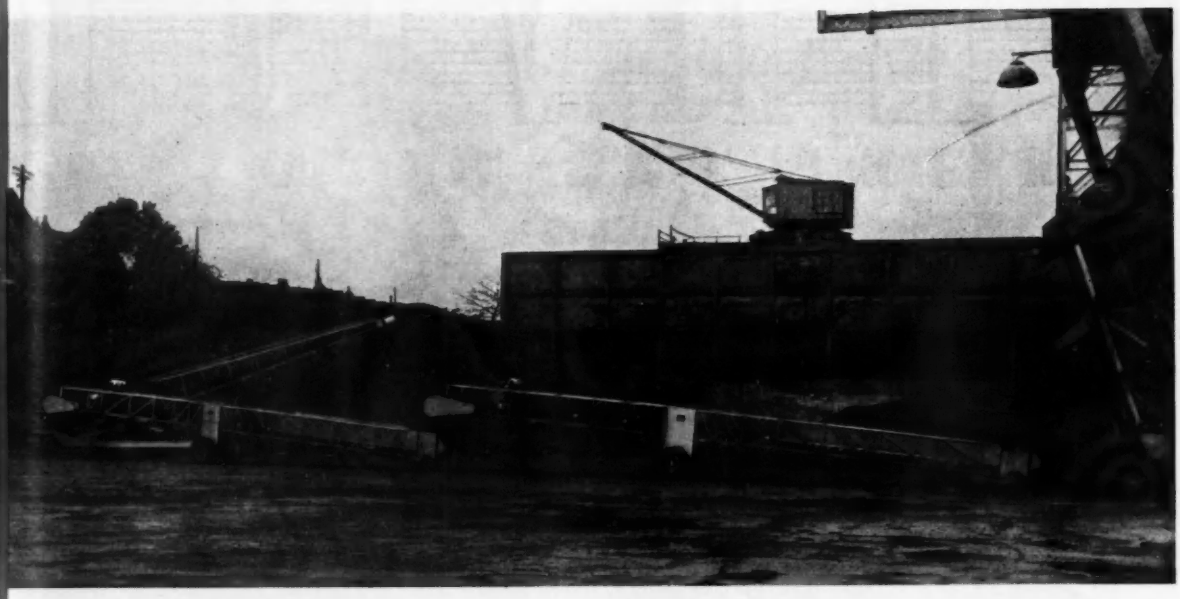

At the Plymouth works of the South Western Gas Board these two 50 ft. C & T Horizontal Conveyors are feeding a 50 ft. C & T Super-Mobile Stacker, which is stacking coal at the rate of 75 tons per hour. So much for operating speed. Now note the features which give the mobility and flexibility that minimize the time necessary for changing the point of discharge: each machine is equipped with a tow bar, and the Stacker has swivelling main wheels which permit it to be traversed radially without disturbing the position of the Horizontal Conveyors.

THE C & T 50 ft. MAMMOTH STACKER

This high capacity machine, designed for handling coal and coke, is easy to handle and can be towed long distances, by the mobile shovel that feeds it, at speeds up to 20 m.p.h. The photograph shows this diesel-powered MAMMOTH stacking breeze. Note the enormous overhang which its perfectly balanced design permits. Fed flat out by three mobile shovels, it stacks 46 tons of coke per hour to a height of 25 feet.

CRONE & TAYLOR LTD.

SUTTON OAK, ST. HELENS, LANCS.

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Whatever your conveying and storing problem may be, do not hesitate to consult us. Doubtless, with our considerable experience, we can help you.

Photographs by courtesy of South Western Gas Board, Plymouth, and South Eastern Gas Board, Wandsworth.

CT3718

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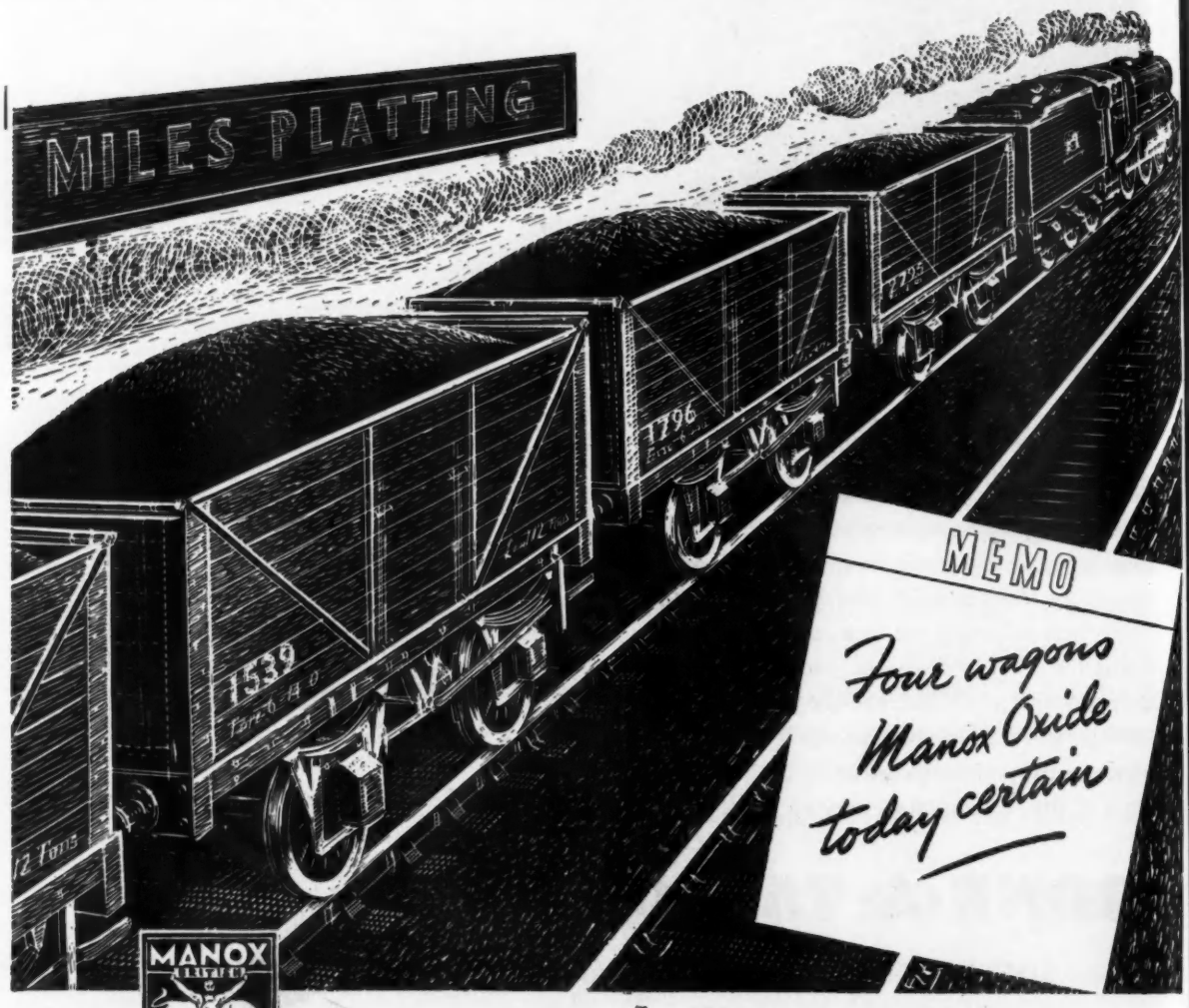

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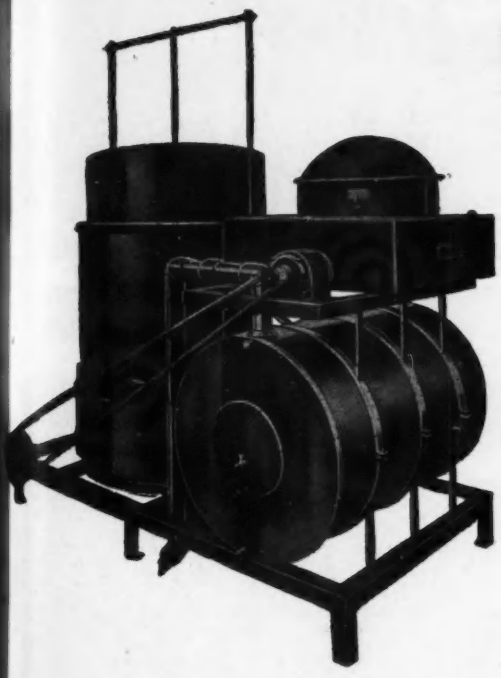

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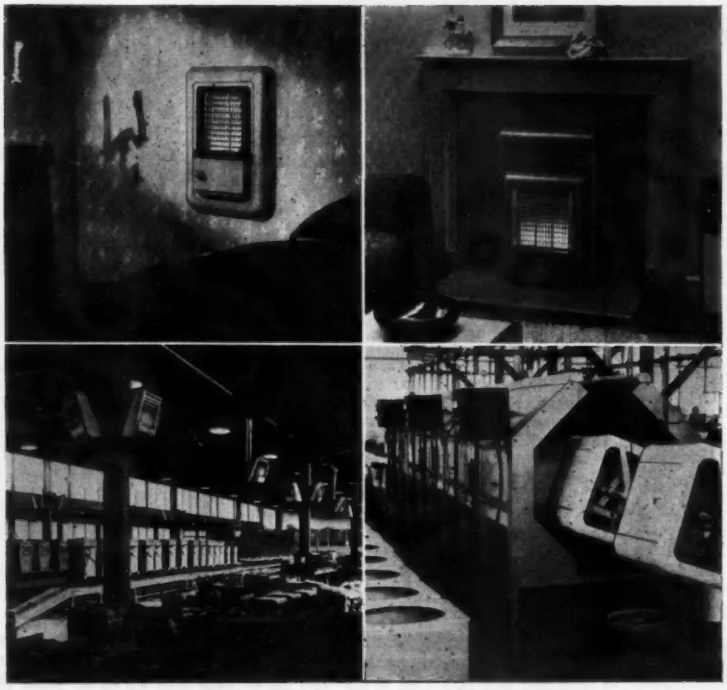

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★ *The Portcullis 'Camelot' Gas Fire.*

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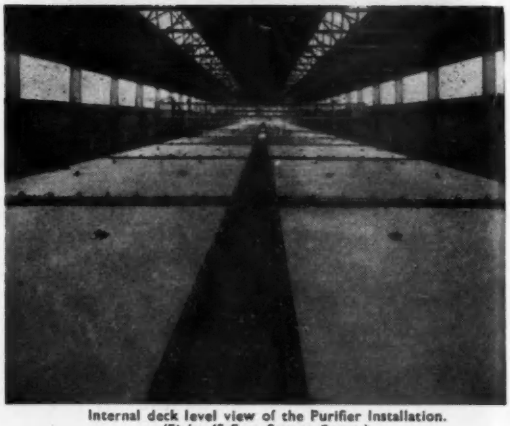
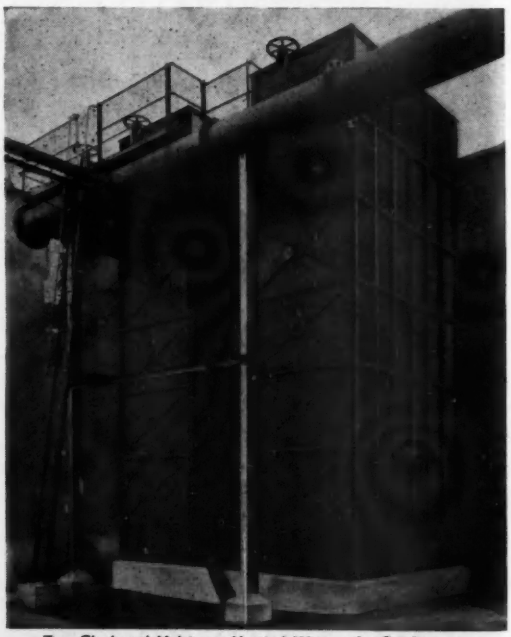
- Special Pipes and Connections in cast iron and steel

Two Clapham-Barwick Pumpless Static Ammonia Washers.



Internal deck level view of the Purifier Installation. (Eight 45 Feet Square Boxes.)



Two Claphams' Multi-pass Vertical Water-tube Condensers.

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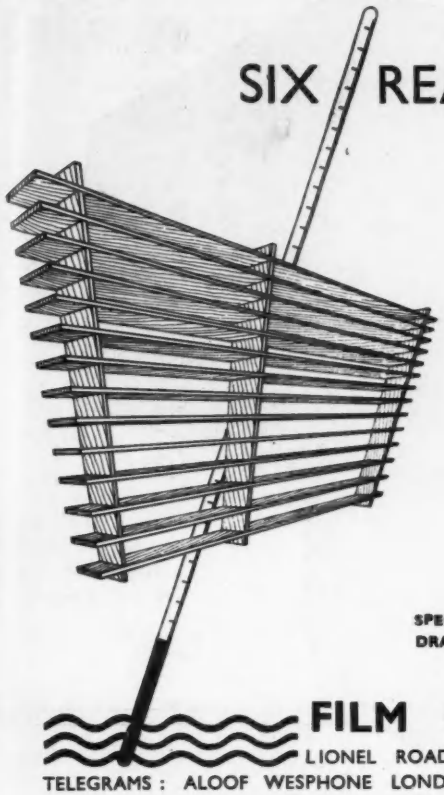

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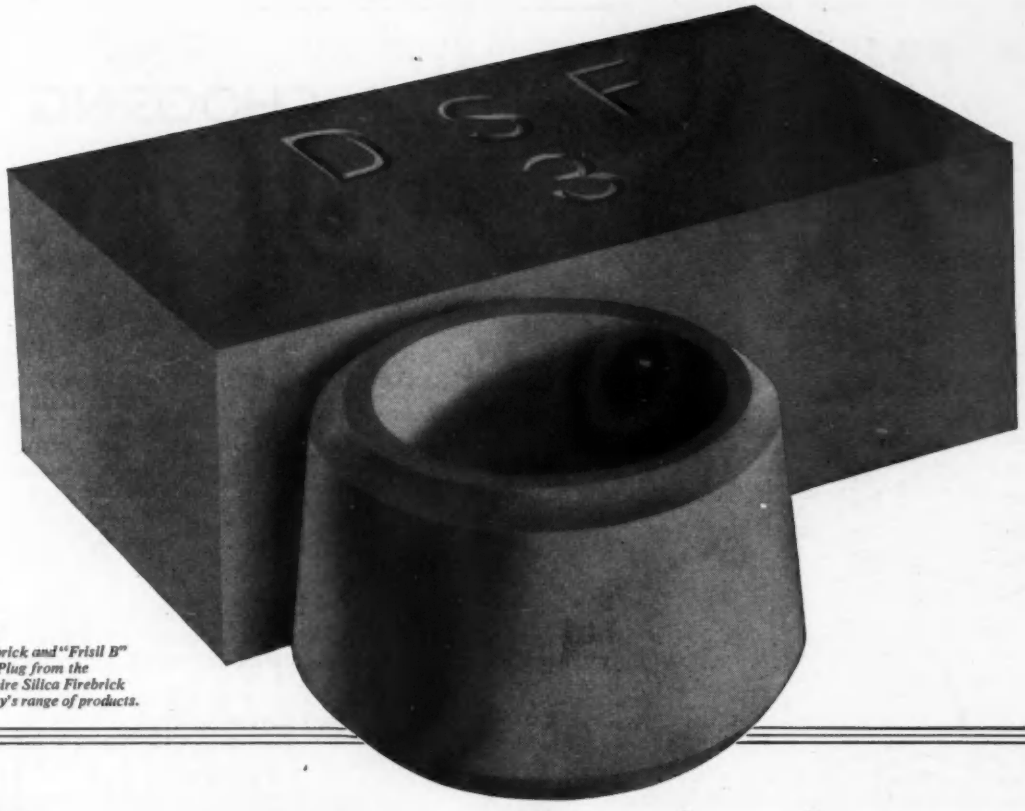

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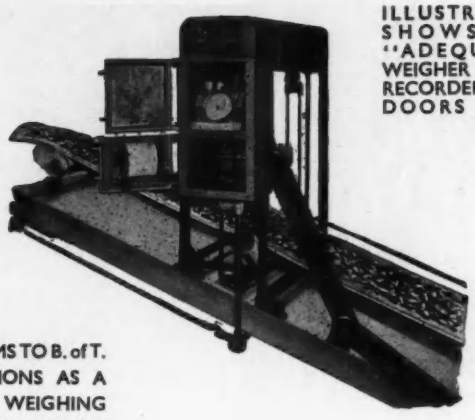

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Complete plants can also be built for ammonia recovery as sulphate of ammonia.

Control room

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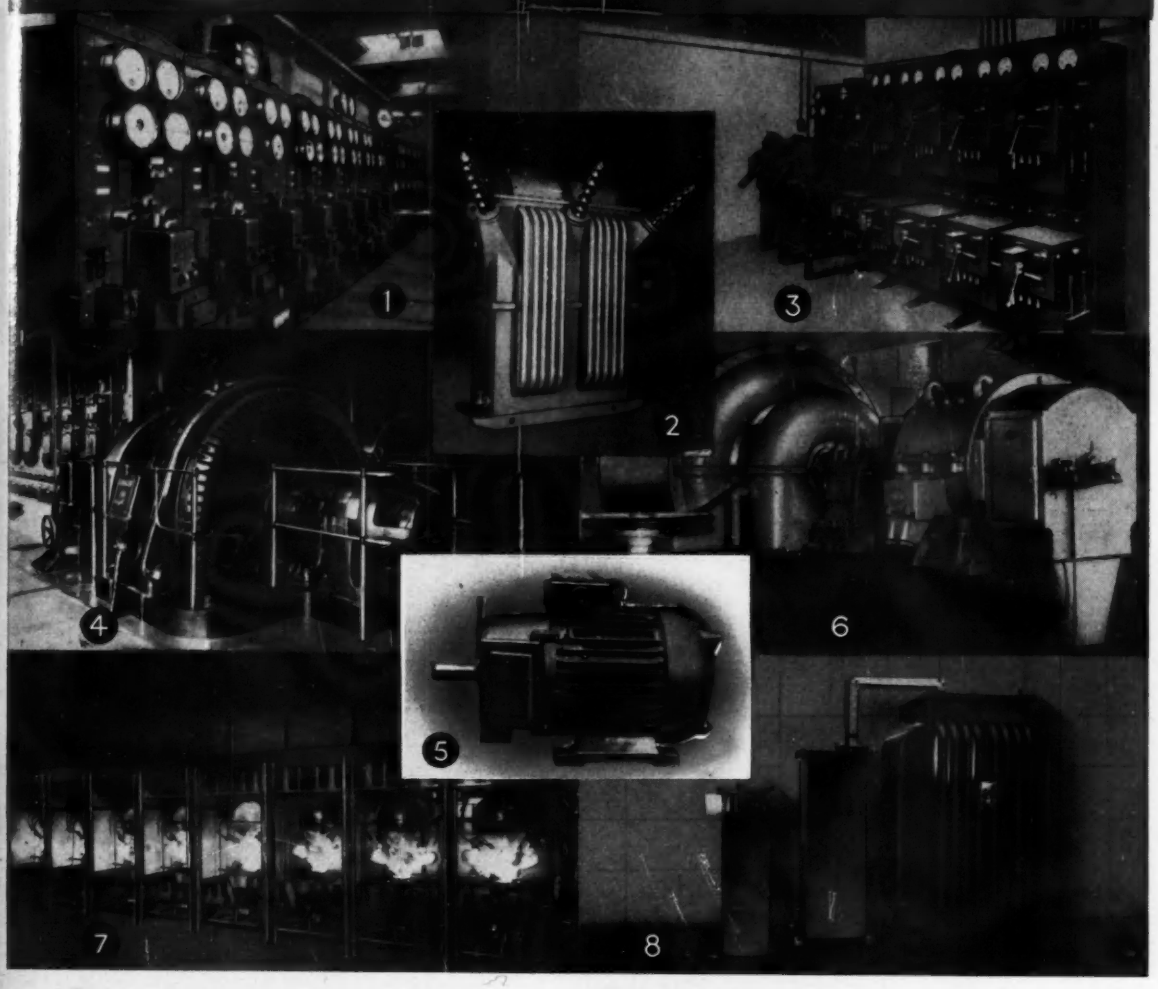

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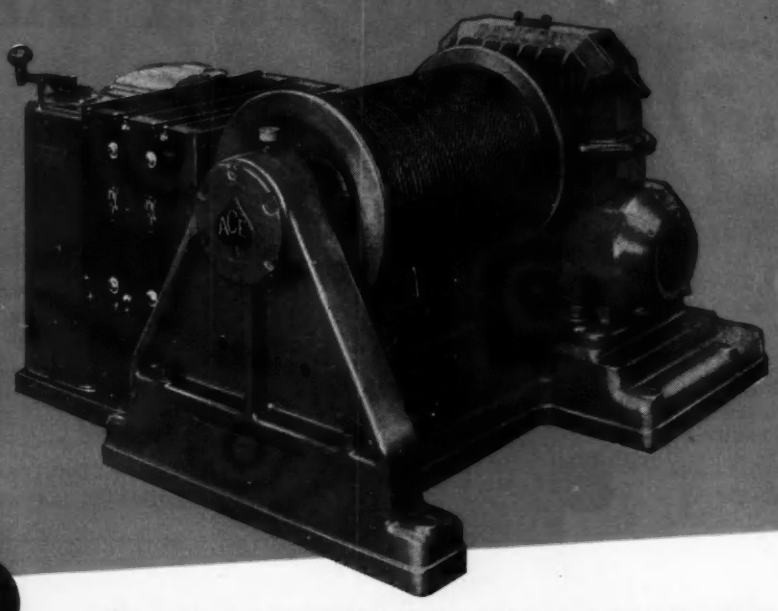

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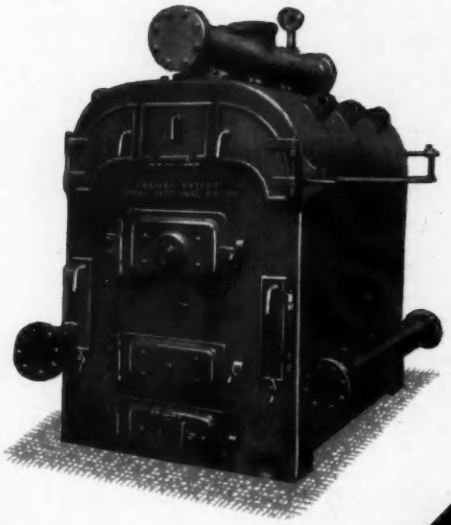

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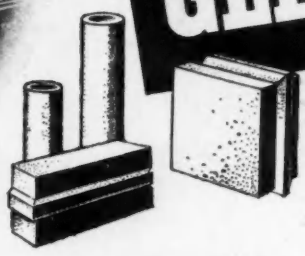

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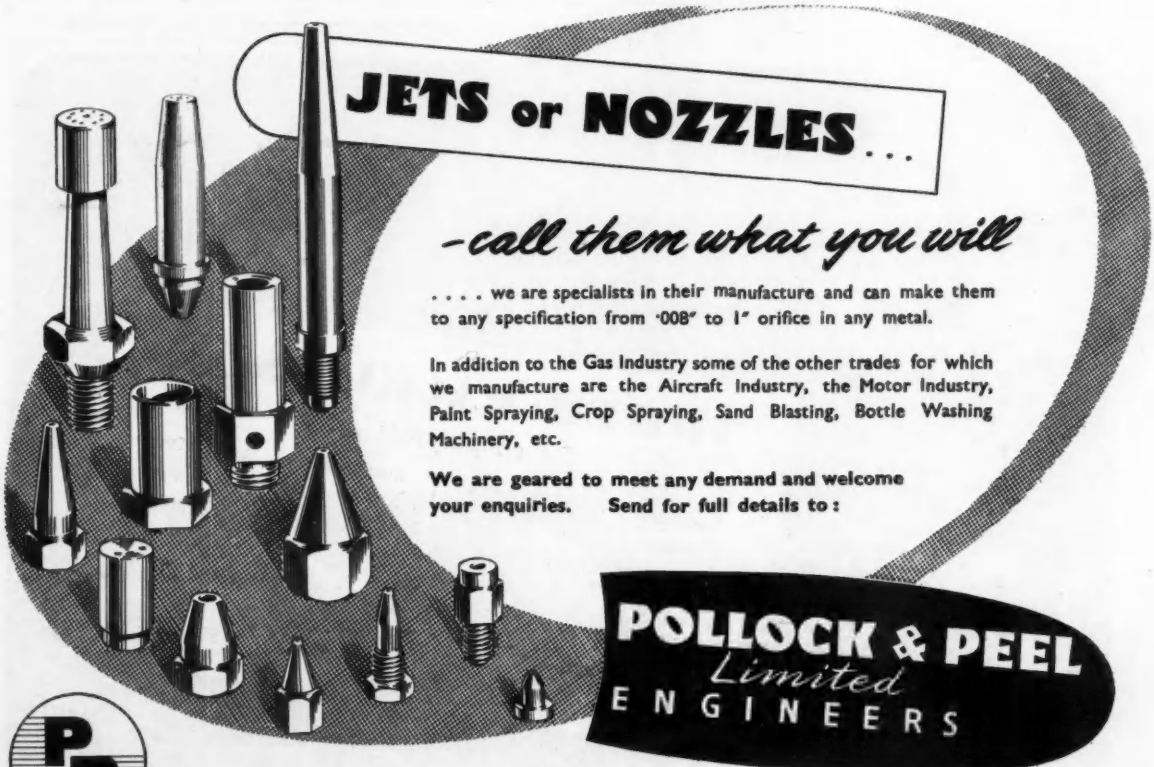

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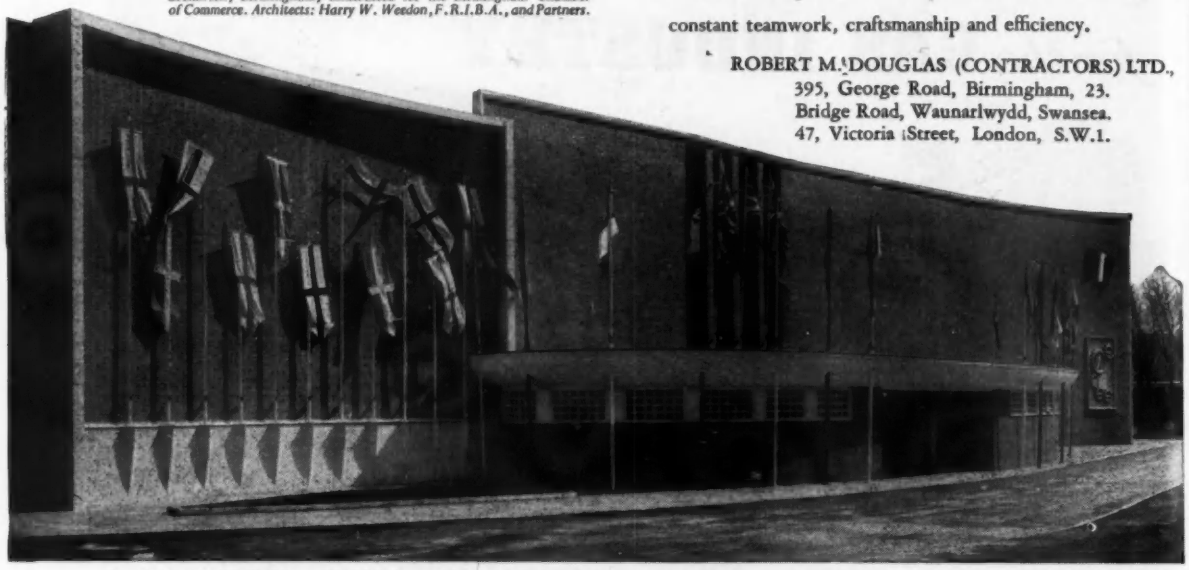

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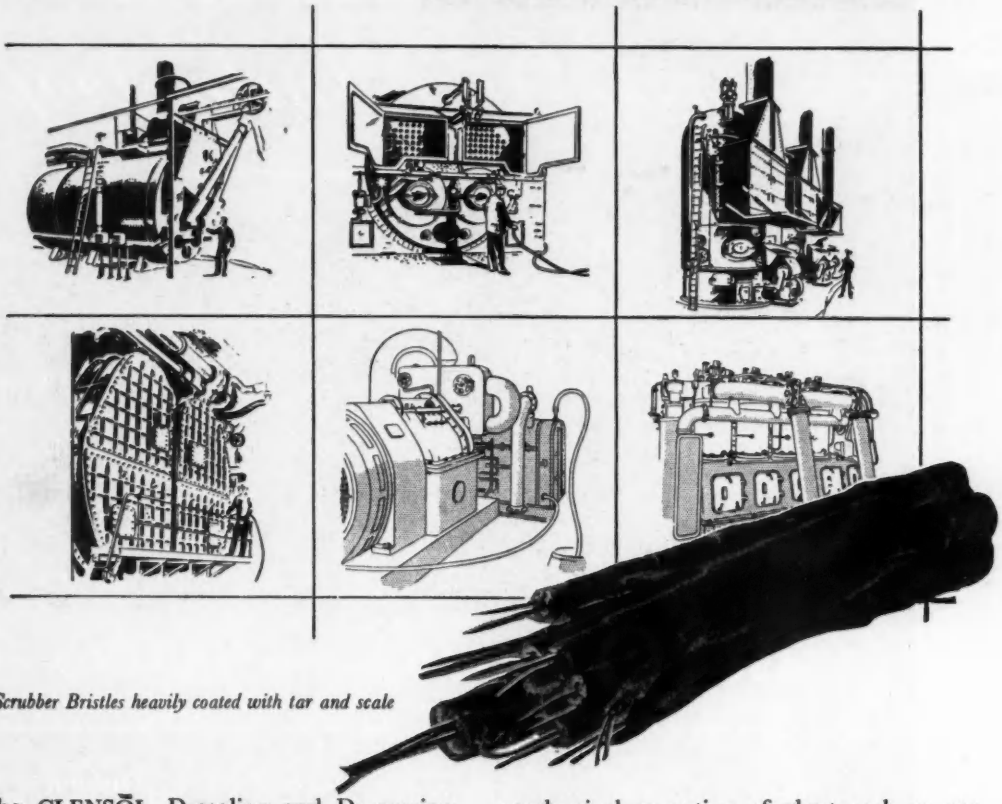

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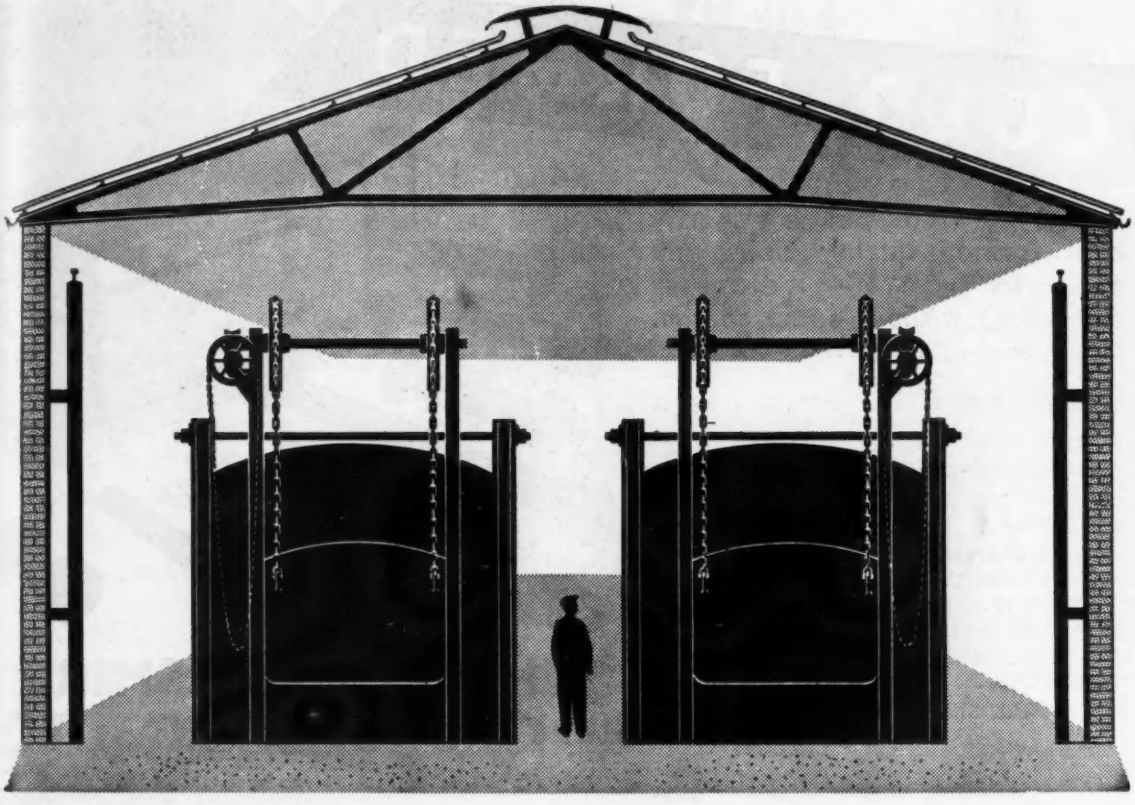

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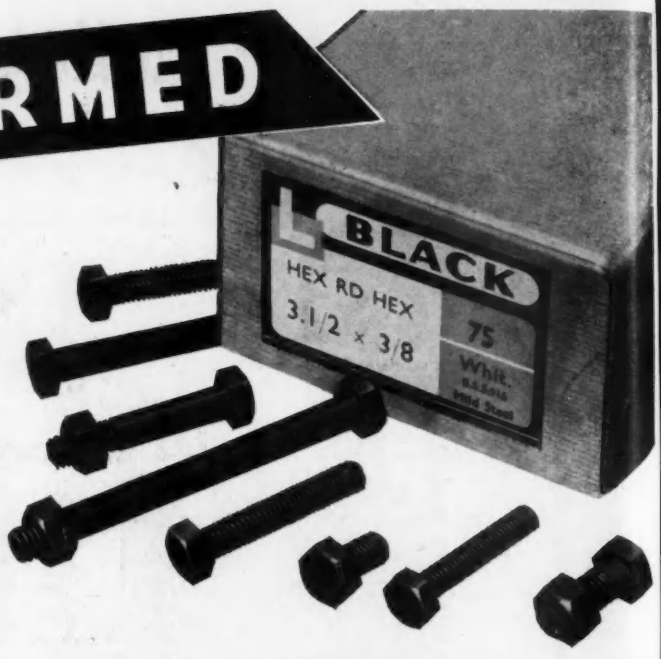

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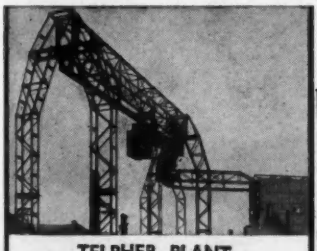
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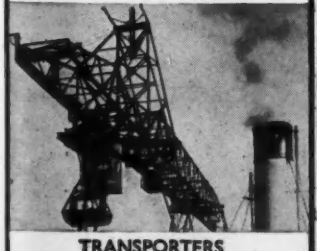
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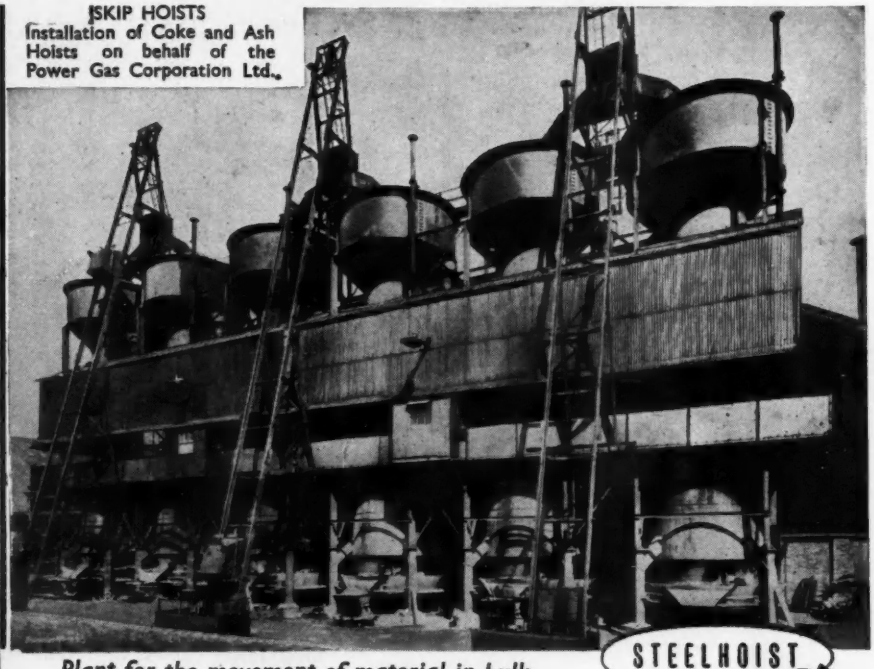

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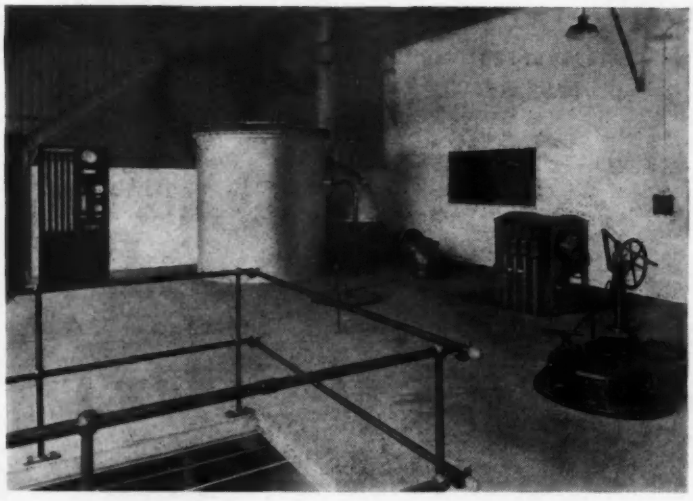

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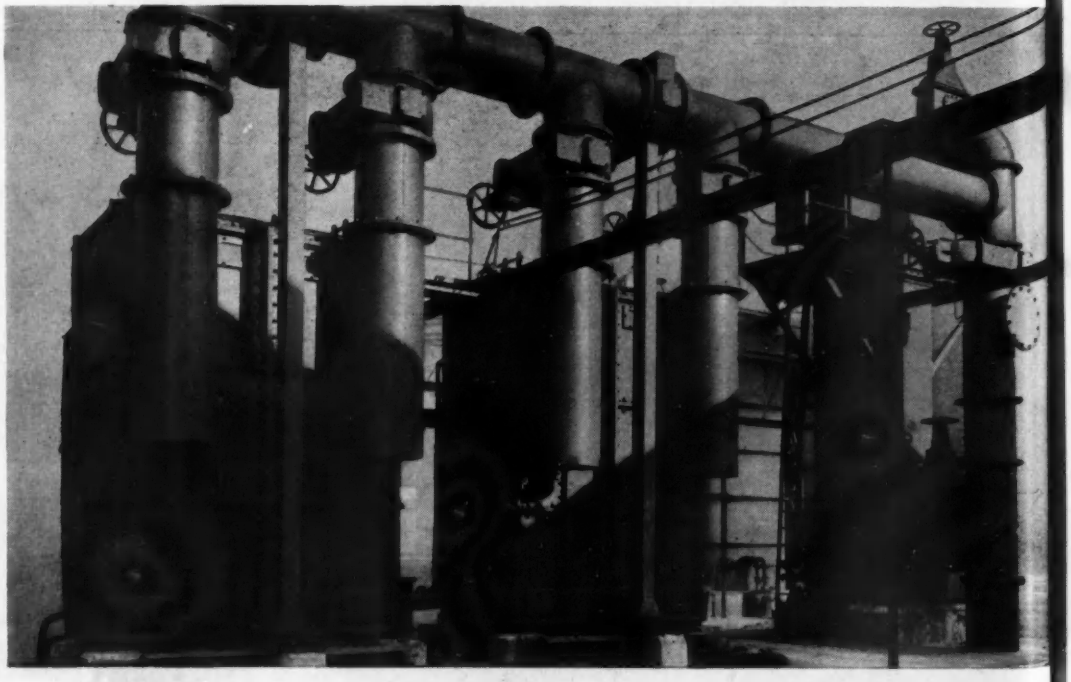

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B 21

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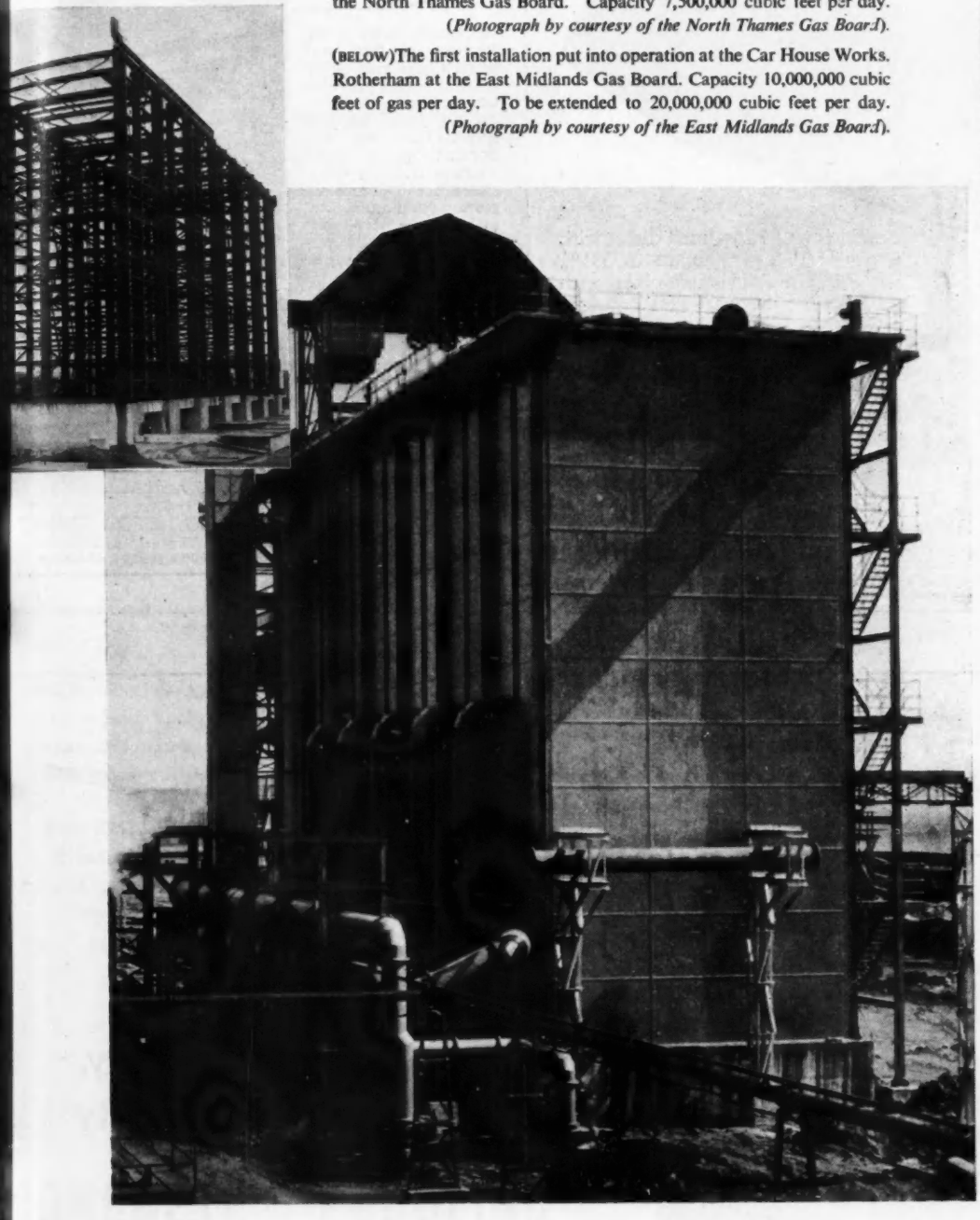
(LEFT) An early stage of erection of the plant at the Southall Works of the North Thames Gas Board. Capacity 7,500,000 cubic feet per day. *(Photograph by courtesy of the North Thames Gas Board).*

(BELOW)The first installation put into operation at the Car House Works. Rotherham at the East Midlands Gas Board. Capacity 10,000,000 cubic feet of gas per day. To be extended to 20,000,000 cubic feet per day. *(Photograph by courtesy of the East Midlands Gas Board).*



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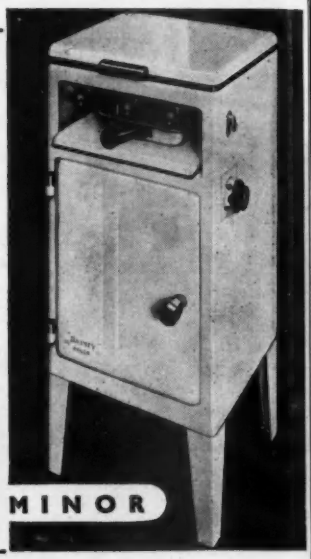

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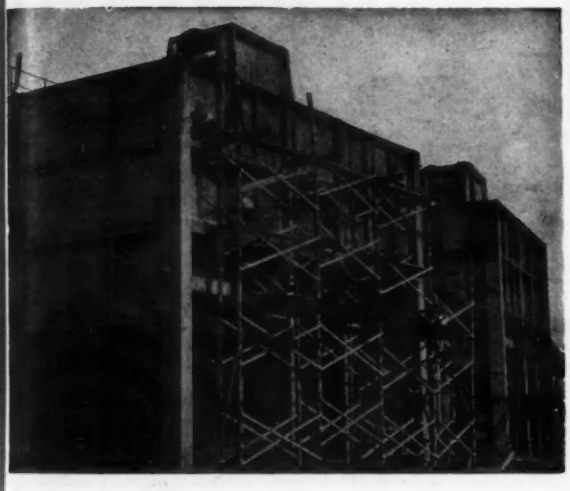

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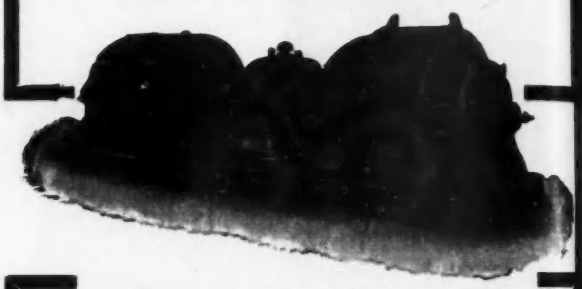

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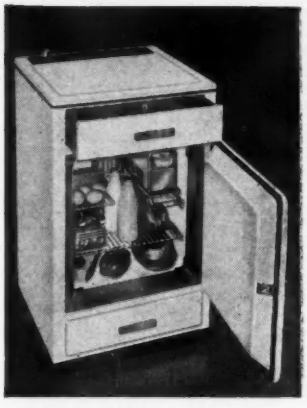

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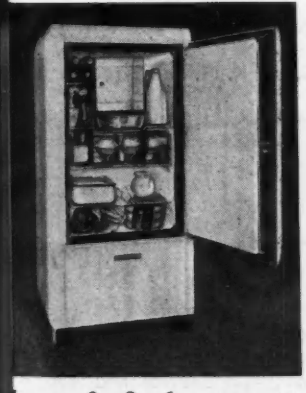

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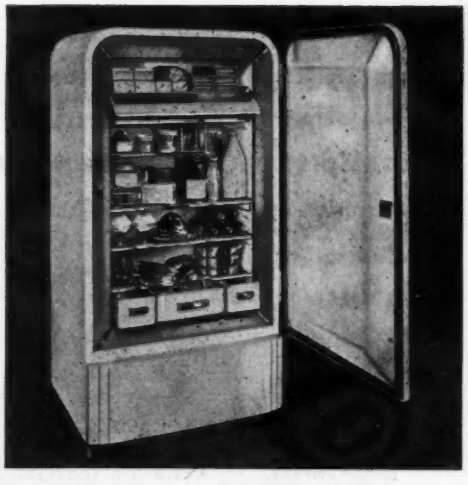

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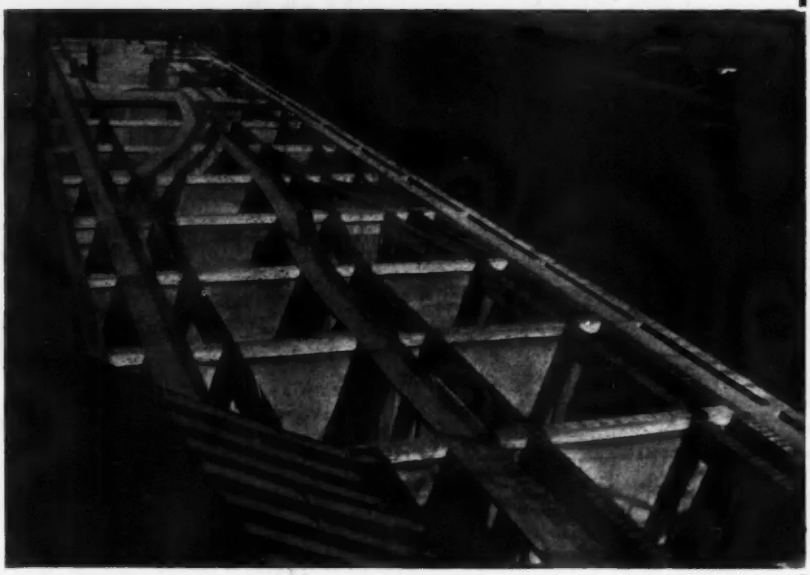

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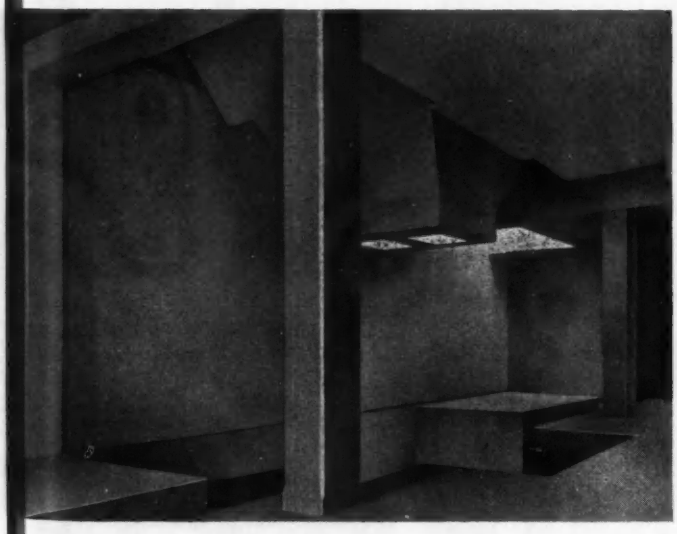

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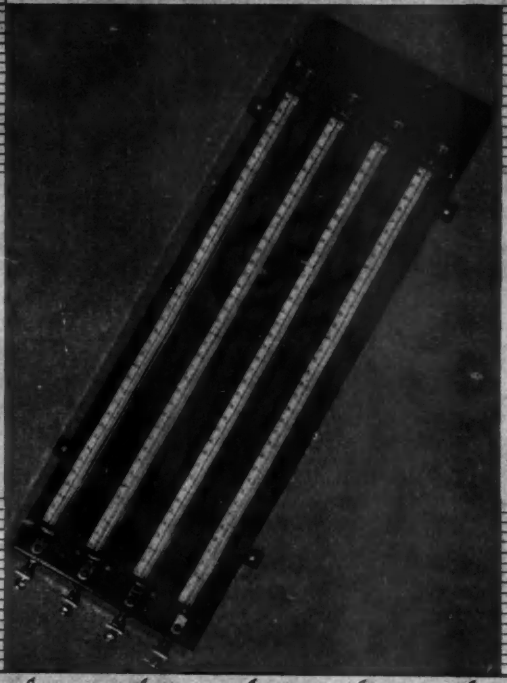

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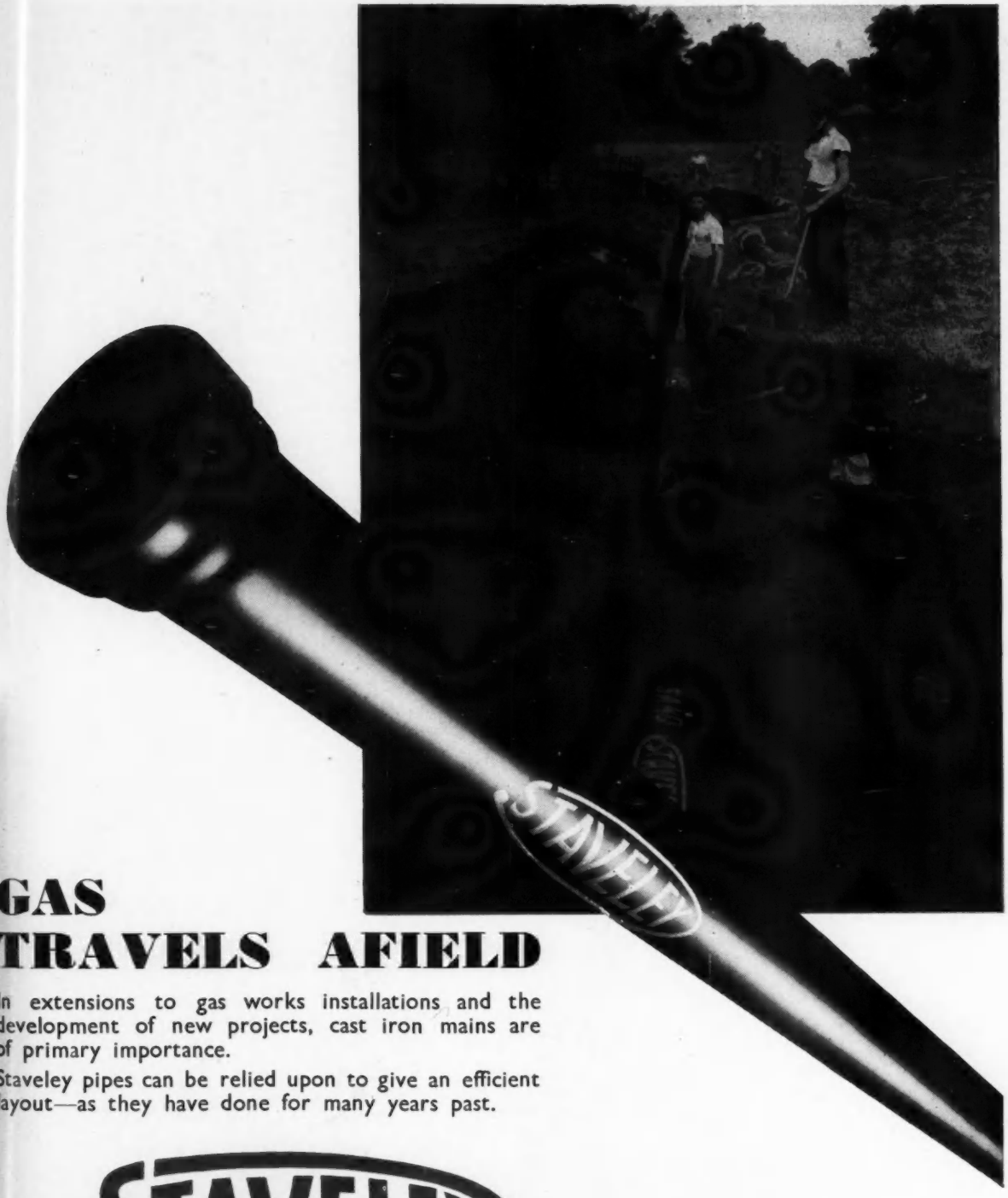

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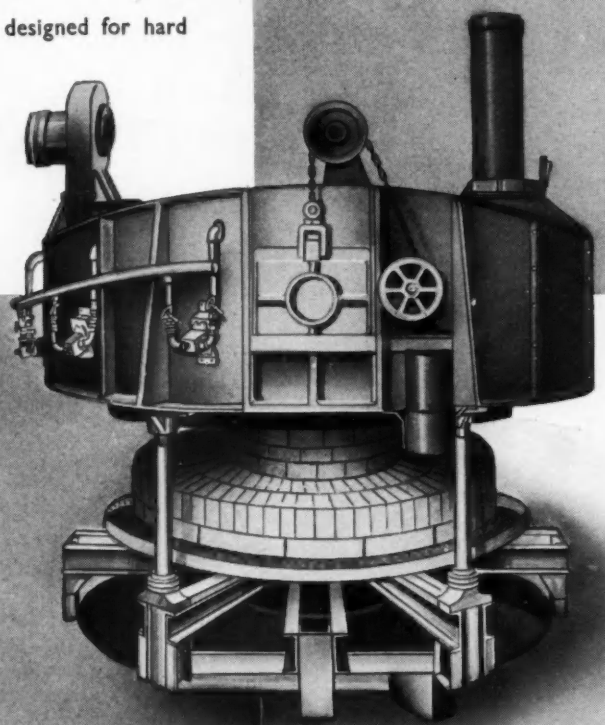

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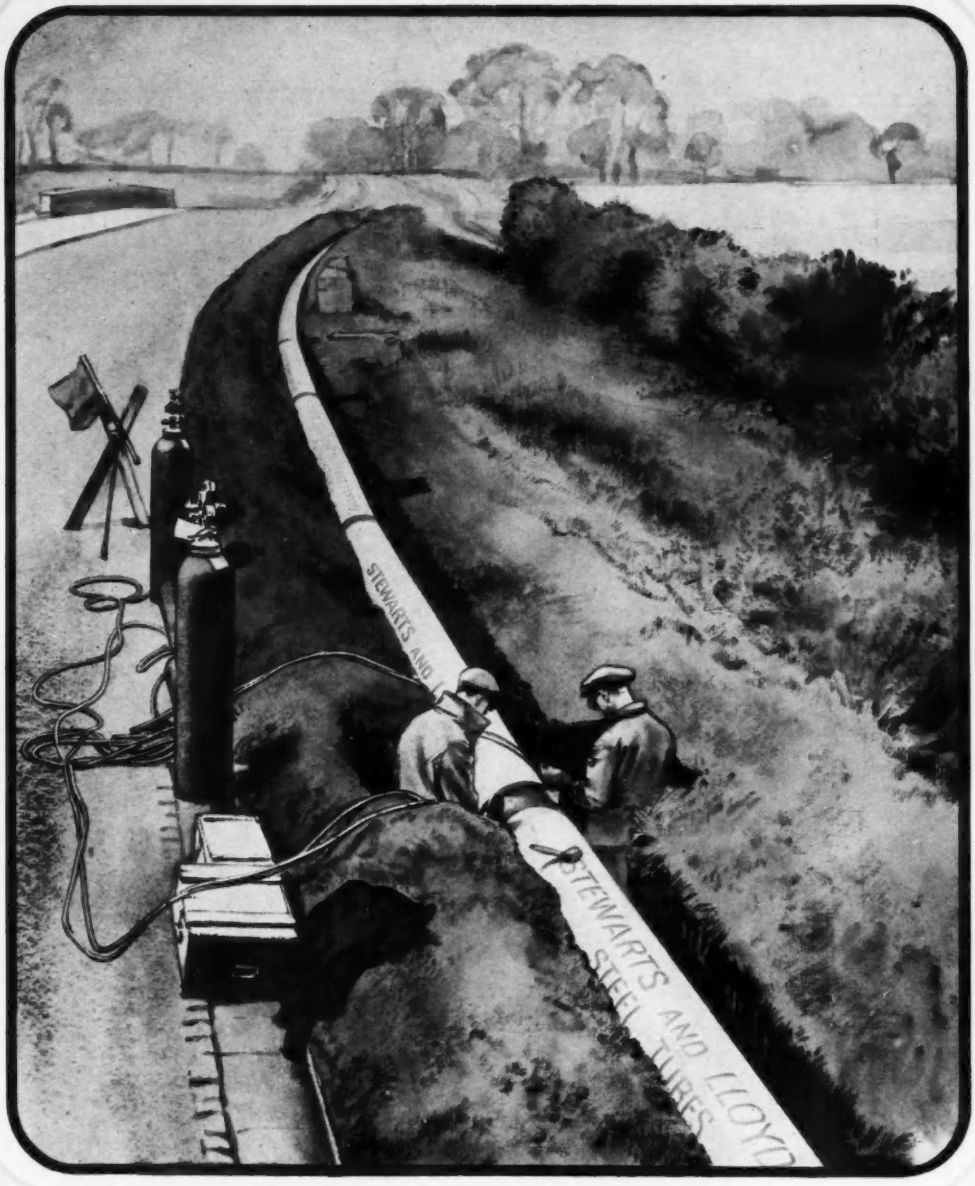

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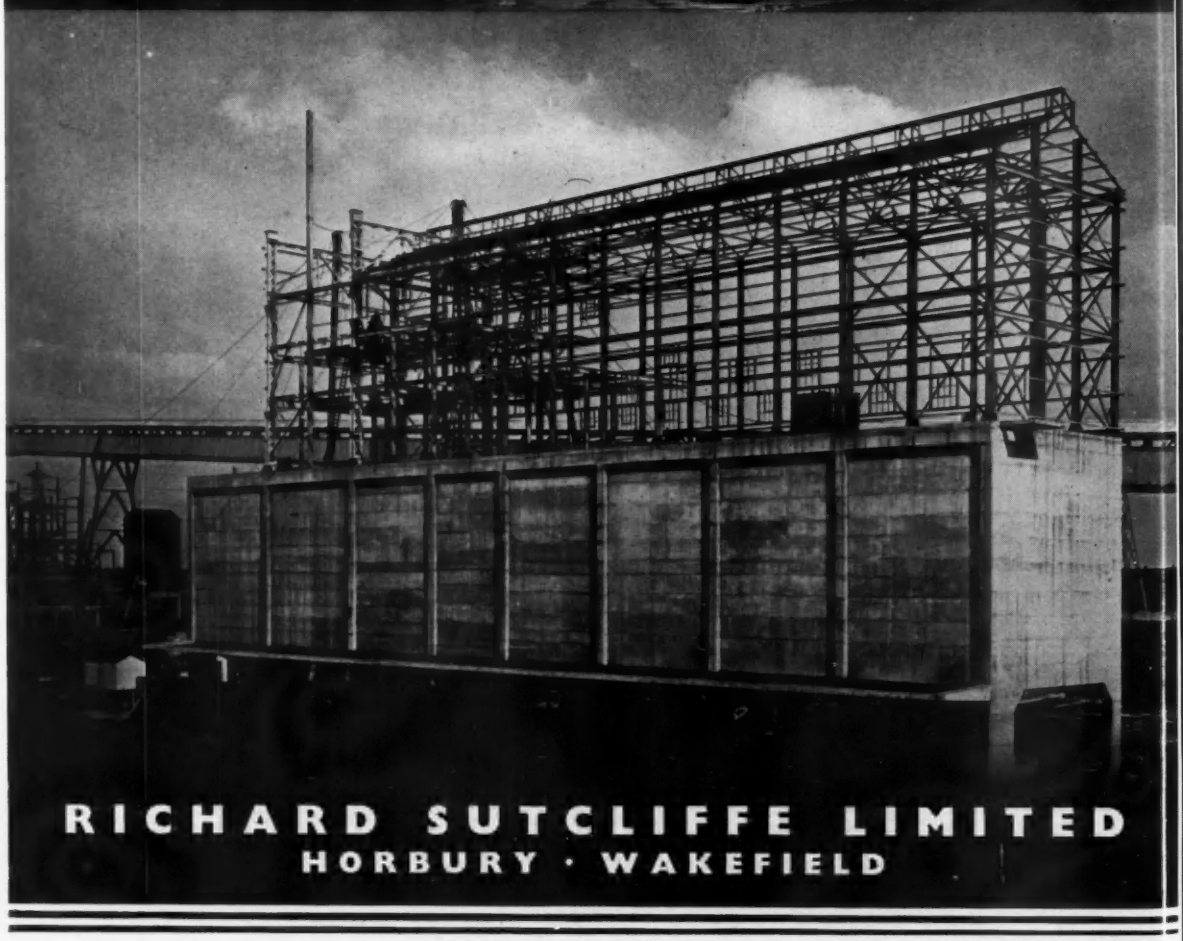

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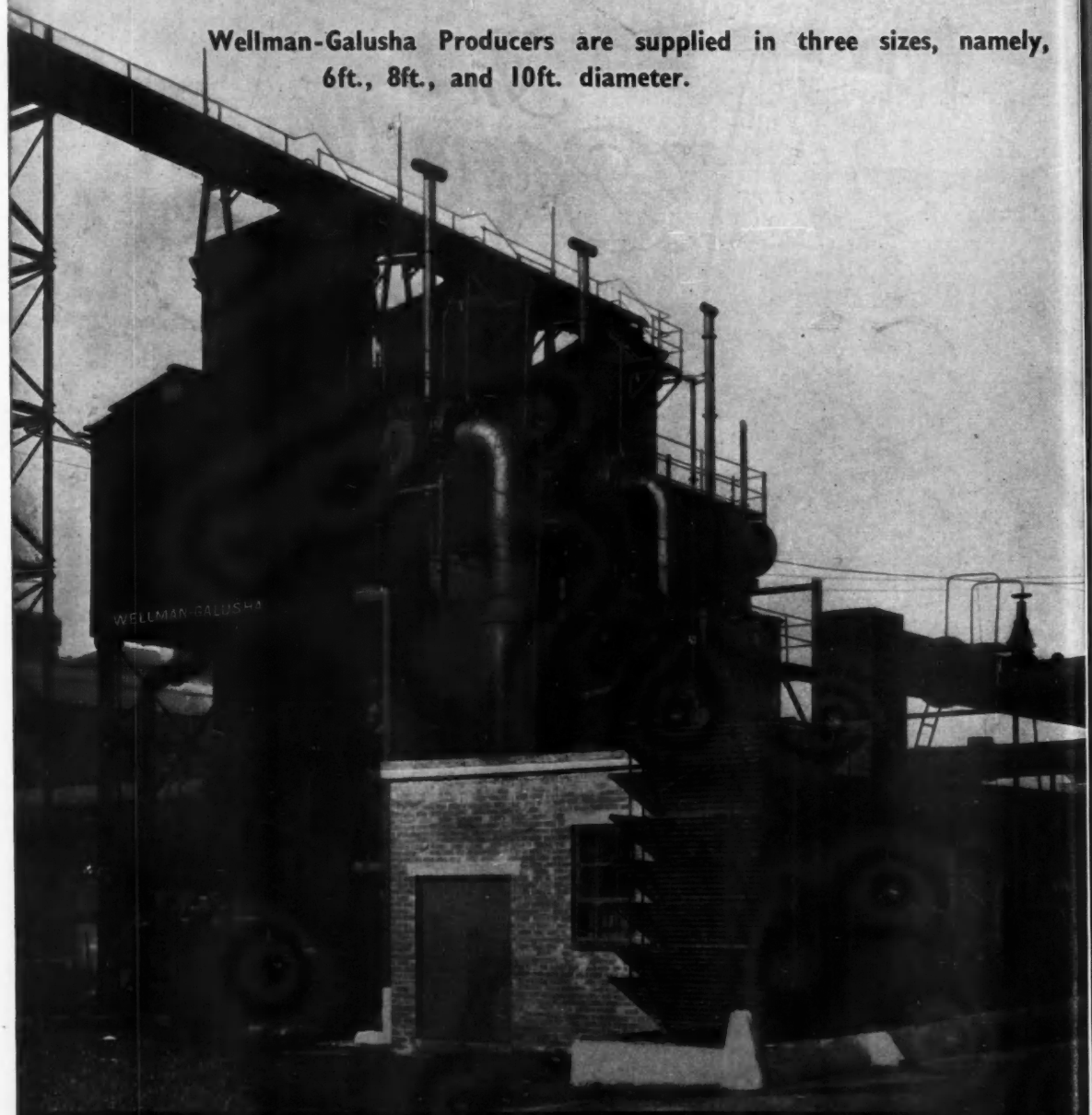

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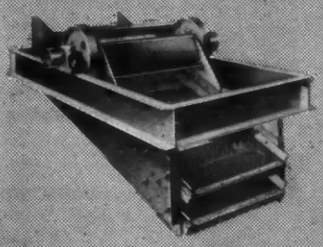

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Arbroath	1
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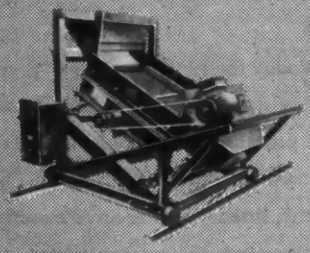

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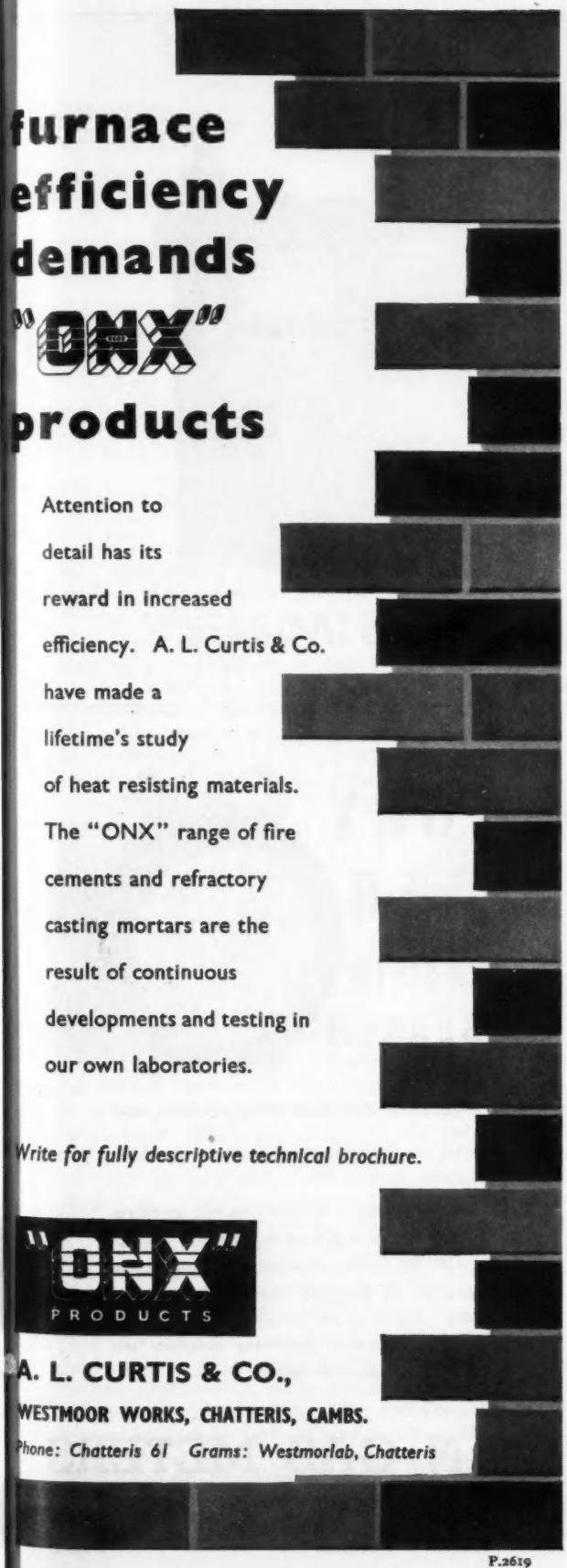

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Gas Journal

105th YEAR OF PUBLICATION

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GAS JOURNAL

VOL. 274. No. 4696 | 105TH YEAR | June 3, 1953

A CROSSING OF THE WAYS

IT may appear to some that the 90th Meeting of the Institution was pervaded by a sense of crisis, using the word not in the sense of impending disaster but in its true meaning of a crossing of the ways. It is a time for decisions. At such a time it was fitting that the President's Address should take the form of a comprehensive survey of the present position of the industry and of the problems that lie before it. Mr. Currier pointed to three main aspects of this crisis—the revolutionary reorganisation consequent upon the Gas Act of 1948, the disappointing result of Lord Ridley's inquest, the unleashing of a renewed, a fierce competition with the other fuel industries, one of which is in control of the supply of our main raw material.

The President of the Institution
G. E. Currier, O.B.E., M.I.MECH.E.

Of the first there is not much new to be said. On the whole its effects have been beneficial but they have given a new direction to policy all the implications of which are still not yet clearly seen. On the second, he said we have seen 'the recommendations of the Report accepted by the Government.' If that is indeed so we have yet to see what steps are to be taken to implement them. So far the golden opportunity for the co-ordination of production, supply and utilisation of all fuels in the best interests of the nation would seem to be very far from being seized. Nor can it be said that this 'most disappointing' Report pointed the way even to an assessment of the problems involved in any large-minded, statesmanlike consideration of the subject. Turning first to coal, the President rightly remarked that the price of coal is the dominating factor in the economics of the carbonising industries, but he quickly turned to the more fundamental influence of the quantity of coals suitable and available for these purposes. Even accepting the more modest estimates presented at this meeting of the probable rate of growth in gas demand in the immediate future, it is clear that the gas industry together with the coking industry will require considerably more coal than is likely to be available in the next 10 years. The prospect of obtaining these additional supplies is not at all reassuring and if they are obtained it will be at a further enhancement of cost. Once again we echo the President's doubt of the wisdom of looking to exports of raw coal to assist the national economy, whether it would not be wiser to retain our coal to meet the requirements of expanding industries producing goods of higher labour content. In the meantime his protest against the apparently unfair incidence of gas coal prices will be welcomed. In the first place it will be noted that absolute control over quantity, quality, and price of our main raw material lies in the hands of the National Coal Board, itself one of our principal competitors in the fuel market, and in the second place, as Sir Harold Smith pointed out at the conclusion of the meeting, price increases of coal and transport have added an additional burden of no less than £18 mill. within the last three years. Contrasting gas coal prices with those levied on other industries, Mr. Currier asked the very pertinent question: 'Is it in the national interest to make those (the carbonising) industries pay a premium on their purchases to subsidise, in effect, those consumers who use coal at efficiencies as low as 20%?' Mr. Currier welcomed the appointment of a Committee of the Chairmen of the three main Boards under the Chairmanship of the Minister himself, as indicating some progress. It is to be hoped that this Committee will take a more urgent and realistic view of the situation than that represented by the Ridley Report.

G.J. No. 5044

The President, G. E. Currier, O.B.E., delivers his Address. On the platform with him are (left to right) Colonel Sir Harold Smith, C.B.E., Chairman of the Gas Council, and Dr. W. T. K. Braunholtz, O.B.E., Secretary, and John Terrace, Honary Secretary, of the Institution.

INSTITUTION CORONATION MEETING

THE 90th annual meeting of the Institution of Gas Engineers opened on the morning of May 19 under the presidency of Mr. G. E. CURRIER, O.B.E., M.I.MECH.E., Deputy Chairman of the North Eastern Gas Board, at Church House, Westminster. And again we sensed general approval of the choice of venue for the meeting. It is obvious that in England Laity and the Church see much in common.

The PRESIDENT informed the meeting that the following telegram had been sent to the Queen:

'The Members of the Institution of Gas Engineers, to which your Majesty has been graciously pleased to accord your Patronage, being assembled in London at the 90th Annual General Meeting, humbly desire to convey to Your Majesty this expression of their loyal and devoted duty and of their earnest and heartfelt wishes on the forthcoming occasion of your Coronation.'

Mr. CURRIER then turned to extend a welcome to friends from overseas. He referred especially to MM. J. Kec, M. Ferlet, A. Lihrmann, P. Mougin, and G. Robert, of the French Gas Association; to Drs. H. Konig and H. Kaun of the German Gas Association; to Drs. M. Sales, E. Sospisio, and L. Ronza, of the Italian Gas Association; to Mr. J. H. Steinkamp, of the Netherlands Gas Association; to Mr. John Irminger of the Norwegian Gas Works Association, and to Mr. H. L. D. Raeber, of the Swiss Gas and Water Association.

They had also present overseas members in the persons of Mr. L. F. Nicholson, of Colombo, Mr. R. J. S. Thompson, of Barcelona, and Mr. F. Tyndall, of Hong Kong.

The President then moved the adoption of the 90th annual report of the Council for 1952-53 and the accounts for 1952. This was seconded by Mr. J. W. DENTON, G.M., Torquay.

The PRESIDENT called upon the Secretary, Dr. W. T. K. Braunholtz, O.B.E., to read messages of greeting received from oversea.

Dr. BRAUNHOLTZ explained that the President had received from Mr. Robert W. Hendy, the President of the International Gas Union, whom we had very much hoped to welcome, the following cablegram:

'Congratulations and very best wishes to you and members of the Institution of Gas Engineers for a successful meeting as you convene for the 90th Annual General Meeting. I regret I cannot be with you.'

Dr. BRAUNHOLTZ added that they had received a message from General A. Pirot, President of the Belgian Gas Association, and a personal greeting from Colonel H. Zollikofer, of Zurich:

'Dear Mr. Currier, I send to you as the President and all friends and colleagues of the Institution my heartfelt greetings and wishes for a successful meeting.'

We then came to election of officers and so on, with the following results which were announced by Dr. BRAUNHOLTZ.

President, 1953-54: John Tattersall Haynes, General Manager, Western Division, Southern Gas Board.

Mr. HAYNES said that since he joined the gas industry some 45 years

ago he had on many occasions had help and kindly encouragement from the members of this Institution. Now they had honoured him by entrusting to him the highest gift in the profession. He accepted it with grateful thanks, with pride, and with humility.

The following elections were announced:—

Vice-President, 1953-54: William Kenneth Hutchison, Chairman, South Eastern Gas Board.

Auditors: Colonel Sir Harold C. Smith, D.L., Chairman, the Gas Council, and Ernest D. Davey, F.C.A., Wood, Drew and Co.

Honorary Secretary: John Terrace.

Members of Council, 1953-54: Edward Morgan Edwards, Member, Wales Gas Board; Albert Edward Haffner, North Thames Gas Board; Ebenezer Gilfillan Smith, Deputy Divisional Controller, Glasgow Division, Scottish Gas Board; John Ellis Wakeford, M.B.E., General Manager, Birmingham Division, West Midlands Gas Board.

District Members of Council

The SECRETARY reported the names of the District Members of Council—

A. W. Brown (Aberdeen), Scottish Association. B. Clarke, M.B.E. (Lincoln), Eastern Section. A. K. Collinge (Preston), Manchester and District Section. C. R. M. Croft (Brighton), London and Southern Section. J. W. Denton, G.M. (Paignton), South Western Section. W. MacNaughton (Wolverhampton), Midland Section. H. Maycock (Holywell), Wales and Monmouthshire Section. G. W. Perks (Stockton-on-Tees), North of England Section. L. G. Townsend (Liverpool), British Junior Gas Associations' Joint Council. G. Walmsley (Londonderry), Irish Association.

The following four scrutineers were appointed for next year: C. R. M. Croft, E. M. Edwards, W. MacNaughton, and J. E. Wakeford.

Then came the presentation of medals.

Presentation to Dr. Thorne

At this stage Mr. CURRIER said that Dr. P. C. L. Thorne had retired from active service with the Ministry of Education, and in consequence he had retired also from the Education Committee of the Institution of Gas Engineers and the City and Guilds of London Institute, with which he had been associated for over 20 years. As one of Her Majesty's Inspectors of Technical Education, Dr. Thorne made the gas industry one of his principal interests, and in addition to serving on many committees, he had been invaluable to the Institution in maintaining close liaison with the many technical colleges up and down the country in which gas subjects were taught. Many of Dr. Thorne's colleagues on the Council and Education Committee of the Institution felt that they would like to mark the occasion of his retirement by presenting to him a small token of their personal regard and their keen appreciation of his services to the Institution and the gas industry, and accordingly it was his pleasant task to ask Dr. Thorne to accept from all his friends whose names were included in an album a cheque with which it was hoped that he would purchase some article that would not only be useful and bring him considerable pleasure, but would also serve as a memento of his long connection with the gas industry.

The inscription reads: 'Presented to Dr. Thorne on the occasion of his retirement from the Gas Education Committee of the Institution of Gas Engineers by Members and Officers of the Institution in recognition of his long service to the gas industry in the field of technical education and as a token of their personal regard.'

Presidential Address

This brought us to the Presidential Address, which was published in our Coronation Number of May 27.

Mr. E. CROWTHER, C.B.E., in moving a vote of thanks to Mr. Currier, said that many of them could claim the President's personal acquaintance and friendship; indeed, it was particularly fortunate that, although the Institution grew in size and traditions of personal friendship and confidence were not diminished. Many of them could claim the President's personal friendship over varying numbers of years: his own claim extended over a considerable number, and in addition the President and himself were at one time very closely associated in their work.

During all those years he had learned to esteem Mr. Currier not only as a highly competent engineer, but as the possessor of that far from common attribute—common-sense. The whole of his address displayed that attribute, and from it it was possible to assess him as a man with

G.J. No. 5038

Front row, left to right, W. K. Hutchison, C H. Chester, C.B.E., H. S. Cheetham, and F M. Birks, C.B.E.

G.J. No. 5043

The President Elect, J. T. Haynes, thanks members of the Institution for his Election.

both feet firmly on the ground, with a realistic understanding of things as they were, though by no means blind to the possibilities of future change, and as ready to adapt himself to the circumstances of tomorrow as he had done to those of today.

A Source of Pride

It was not for him to speak of Mr. Currier's services to the Institution during the past year; but since his address opened with a reference to the high distinctions which the Institution had enjoyed during the year at the hands of Her Majesty and of the Duke of Edinburgh, he thought he might properly say that it would be a lasting source of pride and happiness to their President that those distinctions were received during his year of leadership of the Institution. Each of them would, no doubt, have his own views as to the order of importance which should be given to the numerous points upon which the President had touched, and the em- President had touched.

It was clear to all that Mr. Currier had no illusions as to the strenuous times ahead and the growing strength of the competition which they would encounter. His call for the highest level of efficiency and economy in all their operations was timely, as was equally his implied warning against unremunerative capital expenditure, whether this was occasioned by an excessive zeal for perfection on their own part, or on that of the many authorities who had a voice in these days in their affairs—Town and Country Planning, Royal Fine Arts Commission, Rivers Boards, and the like, all of whom had a voice in their affairs until the critical moment came when the bill had to be footed.

Mr. Crowther said he hoped, too, that their friends of the National Coal Board would not fail to hear and consider the President's remarks. They were, of course, in a dilemma, since in their evidence to the Ridley Committee they frankly emphasised the importance to the national fuel economy of the carbonising industries. In so doing, it seemed probable that, like themselves, they anticipated that the Committee would make positive recommendations influencing users of fuel towards giving preference to the products of carbonisation. Since these anticipations had not been realised, the onus was surely now upon the National Coal Board to implement their views by giving a price preference to the carbonising industries. It was certainly very difficult for them to justify the course which they had in fact taken, which tended to operate in the direction opposed to the policy they had advocated. Their system of charging at the present time had rather the reverse effect to the policy which they advocated and was illogical and inconsistent with their own views.

The third outstanding point of the address was the suggestion that much could be done to increase the competitive power of gas by reducing utilisation costs, both by increasing the thermal efficiency of appliances and by reducing their original costs and the costs of their upkeep. These suggestions deserved the most careful consideration of all those concerned.

A Clear Head

Mr. T. C. FINLAYSON, who seconded the vote of thanks, said that if it were possible for a dilemma to have three horns, then he was on them now. In seconding this vote he was faced with three problems. First, there was very much in the address which was worthy of comment, and it would give him great pleasure to turn the spotlight on to some of the statements in it, but custom ruled that a presidential dissertation was not subject to detailed discussion. Secondly, he would like to have commented in detail on the President's long and successful career in the gas industry, comments which would be based on friendship stretching over many years. Thirdly, he was well aware of the President's well-known desire for the efficient conduct of these meetings, which excluded verbosity.

When Mr. Currier was elected President of the Institution the members knew that he would show that same fearlessness, enthusiasm, and common-sense which had characterised his life in the gas industry. He could not say more than that the Presidential Address had come up to all expectations. In various ways Mr. Currier had then given a clear lead, such as when he reminded them that one of the functions of the gas industry was to ensure that solid smokeless fuel for domestic purposes was always available in the right place at the right time, or when he reminded them that the acid test of new gasification processes in the long run was whether they would produce a cheaper therm. But what they would particularly remember in the address was its well-timed call for faith and enthusiasm in the gas industry and its encouragement of the spirit of adventure.

Came the first paper at the meet-

ing—that by Dr. R. J. Sarjant, O.B.E., who occupies the Chair of Fuel Technology at Sheffield University. This paper, which was slightly professorial, reviewed some of the modern problems of furnace heating from the point of view of the user. Discussion was included of the trends in the use of fuels alternative to town gas, with some reference to new work on the mode of heat release from coal in combustion chambers. Instrumentation and mechanisation are regarded by Dr. Sarjant as essential features of modern gas-fired furnaces, which have thereby some advantages in this respect over alternative fuels. In the paper a broad outline was given of modern problems in furnace design. Certain experimental work in this field was outlined, and reference was made to the application of modern mathematical methods to the assessment of heat distribution in the furnace structure and charge. As we have said, a typical professorial dissertation. We give a full account of the discussion on later pages—and not in expiation of our remarks.

President's Luncheon

So to the Savoy amid the distinguished—see p. 650—and take note of Mel's excellent cartoon on p. 651. Obviously Mel has spotted the calibre of pipe which rejoices Mr. J. T. Haynes, the new President of the Institution of Gas Engineers.

A New Gasworks

We resumed in full force in the afternoon to have presented to us first by Mr. S. K. HAWTHORN, of the West Midlands Gas Board, a paper on special aspects of the new Swan Village gasworks. Discussion on this paper, by the way, was quite outstanding. Our full report of it must be read.

In the paper the author intimated that he was not going to describe the new Swan Village works in detail. The aim was to deal only with those special features of design, layout or operation that represented modern practice, but had, so far, only limited application on gasworks.

The new works, he explained, had a daily manufacturing capacity of 8.5 mill. cu.ft. of coal gas and 3 mill. cu.ft. of water gas, with provision for occasional addition of producer gas to meet exceptional peak loads.

A particular point was made of the combination of continuous vertical retorts operating at high throughput and high calorific value, with externally produced blue water gas to produce a finished gas of 450 B.Th.U. per cu.ft. This method of operation, he said, was expected to produce cheaper gas in present circumstances than was obtainable by steaming continuous vertical retorts to the same calorific value. The provision of a water gas plant for continuous operation in conjunction with the carbonising plant offered, however, wide flexibility of combined operation. Coal throughput could be reduced and steaming increased to give a lower coal gas calorific value, which could be offset by carburetting the water gas, so maintaining the same output of gaseous therms from the combined plants. Without loss of total gas make, coal usage could be reduced by as much as 23% and coke for sale by 38% to suit coke market conditions. tions.

Dr. P. C. L. Thorne.

The introduction of mechanical producers for retort setting heating, continued the author, provided an opportunity for gasifying the small coke of No. 4 grade, which was normally the least salable. These producers were somewhat larger than would be required for No. 3 or No. 2 coke, but the extra size provided a margin of producer gas for dilution for exceptional peak loads by the simple expedient of changing over to a larger grade of coke. The blue water gas used as the everyday diluent was produced in an orthodox set with a carburettor in which gas oil could be gasified when producer gas was used to meet peak-load requirements.

Steam generation was from waste-heat boilers only, working at a pressure of 350 lb. per sq. in. with a steam temperature of 650°F. The whole of the steam passed through back-pressure turbines driving alternators. The exhaust steam, at 20 lb. per sq. in. pressure, was used for process work on both the new and the adjacent old works.

All drives were by electric motor, including exhausters, boosters, and boiler feed pumps, although in the last case a steam-driven standby pump had been provided. Electric power was derived partly from works generation and partly from two independent grid supplies. The electrical arrangements formed a very prominent feature of the new works, and would, it was hoped. form the subject of a separate paper by another author at a later date.

Hot gas detarrers, the author went on, were installed to ensure minimum polyhydric phenol content in the ammonia liquor. The liquor was treated in a dephenolating plant followed by concentration, and the effluent discharged to sewers had an O/A figure of about 650 parts per 100,000. Cooled effluent liquor was used instead of water on the ammonia washers.

G.J. No. 504

Some of the audience in session.

G.J. No. 5039

Another thoughtful group photographed in Church House.

Gas cooling was carried out in vertical tube primary condensers using a very hard well water discharging at a temperature of no more than 100°F., to minimise scale formation; no secondary condensers had been installed.

Turbo exhausters and turbo boosters were driven by constant-speed motors through scoop-controlled fluid couplings, which, in these particular cases, provided a sufficient degree of speed variation. Traction-type fluid couplings were used for numerous other drives.

A single secondary detarrer removed the small carry-over of tar from primary condensers and exhausters. Three four-bay static ammonia washers operated in series, the last being fed with cold effluent liquor from the ammonia concentration plant. An oil washer was installed at inlet tower purifiers to remove final traces of tar, gum-forming constituents, and naphthalene.

Coke screens were of the orthodox horizontal reciprocating conveyor type, but the smaller sizes of coke, Nos. 3 and 4, were also treated on pneumatic cleaning tables. Clean working conditions for screen and cleaner attendants and for maintenance staff had received special attention, and novel provisions had been made.

The Future of Gas

The other paper was by Mr. H. JOHNSTON, O.B.E., Chief Engineer of the North Eastern Gas Board, whose theme was external influences on the future of gas. An abstract of his paper and a full report of the discussion are published on later pages.

The future of gas, said Mr. Johnston, was trammelled by the use of other fuels. Each had a wedge of the not unlimited total fuel requirements, and there was and would be considerable internal pressure within the whole, each endeavouring to deflect and depress the other. To better or even maintain the present trend of gas sales, the real price must be bettered or at least maintained. This demanded not only every effort in daily working with the tools at their disposal, but also recognition of the influence of changing conditions and that new tools and methods would be required in time to meet the situation.

Processes for the complete gasification of poor coking and high ash coals not suitable for carbonisation, but in more plentiful supply, now the subjects of research, as outlined by Dent, would appear to be of vital importance. If investigations now being pursued could lead to a position whereby the major part of additional gas requirements could be satisfied economically by gasification and synthesis, beyond the next 10 years problems of supplies of suitable coals, balancing of coke production, siting of new large works, with attendant difficulties—not so necessary for gasification units as for carbonising plants—would to a large extent be negatived.

To improve the economic position, consideration might be given to larger production units, and to the economic long-distance transmission of gas as against coal. Coke ovens would continue to be built to provide the nation's industrial, and possibly an increasing share of domestic, requirements of coke. They would also provide considerable additional quantities of gas, which would be taken by the gas industry.

The pattern of the future might be that both coke ovens, carbonising higher grade coals, and gasification plants, using low grade fuels, might be sited at pit-head, and that a portion of the 100% base-load gas might be transmitted over long distances and through a national network of mains to reception stations in each area. The remainder of the base-load together with peak-load gas must of necessity continue to be made with existing plant on the spot. Gasification of lower grade coals could possibly lead to feeding electricity generating stations with gas instead of coal, as an all-round measure of economy. Any such development would require a higher order of co-ordination than there was at present.

In emphasis, the main object of the gas boards was to provide potential heat in the form of gas at the lowest real cost. While they were, in the national interest, bound to take in and distribute gas available as a by-product from other industries, when it was economical to do so, they must manufacture from such coal as was available the bulk of the country's gas requirements. Carbonising plants would be retained and maintained. New carbonising plants would of necessity be installed, and for some time gas coke would continue to be produced in increasing quantities, but if the gas industry was to repeat phenomenal performances of the past in overcoming adversity, and maintain its rightful place as the nation's supplier of potential heat, it must give pride of place and effort in its development programme to an early practical solution of new techniques, of which gasification was the most promising. The sooner there was recognition of major external influences, the sooner mounting difficulties would be met, and gas achieve its rightful destiny.

Reception and Dance

Everybody enjoyed the Reception and Dance on the Tuesday evening at Grosvenor House, Park Lane. There was room to walk around, the ladies and their dresses were colourful, and the event, in a word, was elegant.

The Question of Blending

Wednesday morning duly arrived, the first item on the agenda at the meeting being a paper on 'The Blending of Coal for Carbonisation, with Special Reference to Oven Coke Manufacture'—a somewhat lengthy title, by Mr. G. E. HALL and Mr. G. L. LEE, of the British Coke Research Association. Any widespread development in blending techniques by the gas industry, they said, could be expected to be devoted to the aim of liberating extra gaseous therms rather than the attempt to make drastic modifications in the properties of coke. The gas industry was, however, showing increasing interest in the

use of coke ovens as a means of carbonisation, and it was logical to suppose that it was through the medium of coke ovens that any extensive development of blending practice would take place. One important difference between the gas industry and the coking industry should be pointed out. The gas industry on the whole did not resort to the crushing of coal prior to carbonisation. The coking industry, on the other hand, charged to the ovens coal of average size 80% below ½ in. It would, therefore, be much more difficult in the case of the gas industry to consider widespread blending programmes, than in the coking industry, as coal crushing must obviously be a preliminary to any blending practice. This difference in procedure between the two industries was obviously reflected in the consistency of quality of the coke produced. The traditional sources and sizes of supply of coal to the two industries had already been noted. Any widespread alteration in the size limits required by the two industries, which were to some extent complementary at the present time, would appear to involve major problems of supply. The economics of blending depended largely on transport costs. The effect of blending on by-product yields would also require to be taken into account as the yield of by-products varied with the type of coal employed. Transport costs might prevent the use of certain coals, however desirable this might be from the scientific point of view.

It was clear, stated the authors, that much research on blending remained to be done if the best all-round use was to be made of the country's coal resources. The coking industry was pressing forward with this work on the laboratory scale, the experimental-oven scale, and by the erection of full-sized test oven plant, which alone could provide the ultimate answer.

Functional Design

Adjournment was made for a general meeting of the contributors to the Benevolent Fund of the Institution of Gas Engineers, following which a paper was presented by Mr. NORMAN HUDSON, M.B.E., on 'The Functional Design of Gas and Coke Burning Appliances.' The author is Chief Commercial Officer to the North Eastern Gas Board, and his paper is characterised by originality.

Mr. Hudson was forthright in his comments. We shall deal at length with his paper and the discussion which it well merited later. Mr. Hudson's work at the moment is what is loosely termed 'commercial.' However, his observations were of technical interest. As he said, he is convinced that if the industry is to progress it will have to recognise the importance of this task, which is, in his opinion, its most important task today. No mention was made in the paper to tariffs and the price of coke, because, said Mr. Hudson, he felt it would not be correct to do so, although it was admitted that they played a great part in load development. The increase in prices of the industry's commodities made it all the more necessary that it should, by sound functional design of appliances, make every contribution it could to keeping the cost of a service as low as possible. Future expansion of the industry might finally depend on whether or not it was successful in this matter. Mr. Hudson is of the opinion that to be successful the industry must be bold and adjust its thinking, from time to time, to changing conditions.

NATURAL GAS IN GREAT BRITAIN

On Thursday morning, May 21, an important announcement was made by Colonel SIR HAROLD SMITH, Chairman of the Gas Council. He said:

'We are continually being reminded that the supply of good gas-making coal is decreasing and is becoming more difficult to get. This is one reason why we should consider every possibility:

(1) Of developing methods of using coals which we should not normally consider suitable for carbonising by orthodox means.

(2) Of improving the efficiency of existing carbonising processes.

(3) Of searching for new supplies of gas.

Another reason which points to the urgency of taking this action is the rapidly increasing cost of coal. In December, 1951, the price of coal was increased by an amount which has added approximately £9 mill. to the gas industry's annual coal bill. In March, 1953, another increase in the price of coal occurred which will add a further £8 mill. per annum. In December, 1952, an increase in rail charges added another £1 mill. per annum to our cost of coal. While we have been able to avoid passing on the whole of these extra charges, by effecting economies in our costs of production and distribution, by increasing the efficiency of carbonisation, by integration and by reconstruction, these economies in any event would have been to the advantage of our customers who eventually must pay for any increase in the cost of coal. As the President pointed out in his address, one effect of the recent increases in coal prices has been to increase the differential between the price charged for gas coal and the price charged for other coals. The total increase is such as is tending to make gas non-competitive with other fuels not derived from coal, particularly for industrial purposes, while, at the same time, upsetting the competitive balance between gas and coke and

G.J. No. 5030

D. D. Burns, Deputy Chairman, Scottish Gas Board; Sydney Smith, Chairman, East Midlands Gas Board; Dr. R. S. Edwards, Chairman, North Eastern Gas Board.

Interest in the business sessions was sustained. G.J. No. 5041

other fuels derived from coal.

'The Minister of Fuel and Power, in his speech at the President's luncheon, encouraged us to be adventurous and to seek for new methods of gas-making and for new gas supplies. In the report of the Productivity Team you will find these words: "Although there are no appreciable known reserves of natural gas in Great Britain, a discovery of any magnitude would be of immense value to our national economy, and it is suggested that prospecting, where there is any possible hope of success, should continue to receive vigorous support."

'Last year the Gas Council decided to consider the possibility of finding natural gas in this country. We were fortunate in engaging the help of Dr. G. M. Lees, F.R.S., the Chief Geologist of the Anglo-Iranian Oil Company, in this connection. Dr. Lees' advice is sufficiently encouraging to have caused the Gas Council to express its willingness to conduct a large scale exploration for natural gas, and discussions are at present proceeding with the Chairman and directors of the Anglo-Iranian Oil Company with a view to arrangements being made for this exploration to begin. I should like to acknowledge here the help and encouragement we have received from the Chairman and directors and officials of the Anglo-Iranian Oil Company whom we have found most willing to join with us in searching for natural gas, a project which we all feel is in the national interest. There is, of course, no guarantee that gas will be found in any commercial quantity, but it is important to remember that so far when borings have been made these have been made with the object of finding oil, no serious attempt having been made to look for natural gas. It is interesting to note that gas may possibly be found separately from oil. We consider ourselves very fortunate in being able to benefit by the expert advice of the Anglo-Iranian Oil Company, who have all the "know-how" which is so necessary when embarking on an experiment of this kind. It is anticipated that the exploration which we propose to make will be spread over about five years. What the result will be, of course, none of us can yet say. If we are successful the benefits accruing to the consumers of gas may well be considerable. If we are not, at any rate we shall have the satisfaction of knowing that we have not neglected to take advantage of an opportunity of trying to find new supplies of gas. The one thing that is certain is that if we do not seek we shall not find.'

The foregoing announcement was made during the discussion of the Report of the Productivity Team representing the British gas industry which visited the United States of America in 1952, the discussion being opened by Mr. J. H. DYDE, who led the team.

Prior to this discussion, two papers were presented—one by Mr. J. SOUTHWORTH, Liverpool Group, North Western Gas Board, on the expansion of a horizontal retort setting, the other by Mr. L. G. TOWNSEND, also of the Liverpool Group, North Western Gas Board, on the operation of the 'Manchester' liquid purification plant at the Linacre gasworks.

In his paper, Mr. SOUTHWORTH explained that the expansion of a regenerative, horizontal, chamber setting had been measured during the initial heating up period, and at intervals of seven and 15 months after the attainment of carbonising temperatures. The setting was a monolithic structure, and contained a high proportion of silica material. The buckstays were designed so that manual adjustment was possible, and expansion spaces had been allowed along the longitudinal axis.

The objects of the survey were: (i) to compare the restrained expansion laterally and longitudinally with the free expansion vertically, (ii) to ascertain the effectiveness of the expansion spaces, and (iii) to determine whether manual adjustment of buckstays could be carried out satisfactorily without pressure-measuring instruments.

Measurements in the horizontal plane were taken at two positions: from an independently supported wire stretched along the faces of the setting and 3 ft. 10 in. above stage floor level, and across the brickwork at the bench top. Vertical measurements were taken near the centre ports on the bench top, using a dumpy level and staff.

A general, rather than a detailed, examination of the results revealed that the expansion was greater than was anticipated, and that continuous growth had occurred. The majority of this growth took place before the temperature of 600°C. was reached. The buckstay distortion was small and similarity between all the plotted curves suggested that the manual adjustment of the buckstays had been satisfactorily accomplished. There was evidence to suggest that adequate expansion spaces had been provided.

Although it was difficult to arrive at

firm conclusions in a survey of this kind, the author suggested certain indications by a general, rather than a detailed, examination of the results. First of all, that the tension of the tie rods forms a reliable guide to the amount of adjustment necessary to the buckstays. This conclusion is based upon the similarity between all movement curves, when compared with the free vertical expansion. It is suggested that extensiometers should be tried in a future case. Secondly, although a final conclusion upon the amount of expansion spaces to be allowed cannot be formed until further surveys are undertaken, it is felt that, with the information now available, and with adjustable buckstays, the spaces within this setting are sufficient. The exact condition of the expansion spaces cannot be determined until the settings are dismantled, and it is impossible to say whether they have performed the function for which they were designed or whether they have become obstructed in some way.

The Manchester Process at Liverpool

Mr. TOWNSEND explained that towards the end of 1947 the oxide boxes on the horizontal coal gas stream at the Linacre works of the then Liverpool Gas Company were working to capacity, and the position was aggravated by structural damage to the largest set arising from enemy action. It was necessary that some additional purification capacity be installed within a reasonable time. It was natural, therefore, that liquid purification processes should come under review. At that time, there was also the possibility of the installation of a completely new carbonising plant of upwards of 10 mill. cu.ft. per day at another works of the same undertaking. Following detailed consideration of the processes available, it was decided to install a liquid purification plant of the Manchester type at the Linacre works, which, apart from easing the situation at this works, would enable further detailed information to be obtained regarding the process. This information would, in turn, be of value when the purification plant for the new carbonising installation came up for consideration.

Mr. Townsend's paper gives full details of the information that has been obtained from three and a half years of continuous operation of this plant at Linacre, which has a capacity of 3.5 mill. cu.ft. of horizontal coal gas per day. Operating details have been covered very fully. It is shown that, in certain circumstances, which arise not infrequently, a good case can be made for liquid purification. The costs tend to be rather higher than for oxide boxes, but this difference is by no means so great as is generally imagined. The process possesses several advantages, and these are covered fully in the paper. A completely new method of sulphur recovery is described, which results in the continuous production of sulphur of 90% to 95% purity. It is believed that, were this particular grade of sulphur available in any quantity, it would command a higher price than that obtained for the sulphur in spent oxide. This would be justified on the reduced transport charges alone. If liquid purification were accepted on a larger scale, this factor would be sufficient to allow the process to compete with oxide boxes from the financial point of view alone.

Conclusions drawn by the author are as follows:—

The operation of the plant in its present form is reliable from the chemical aspect, and the solution requirements are closely defined when gas from intermittent systems is being purified. The mechanical arrangements are not entirely satisfactory in respect of stand-by; for example, when driving-belts have to be adjusted.

During the last eight months of operation, the Ministry of Fuel and Power's requirements for purity has not been exceeded, although the plant has been shut down for belt adjustments for 32 hours. In its present form, the plant could not be allowed to feed gas direct into holders, if no other purification system were available. Where the plant is working in parallel with a set of oxide boxes, the risk taken could be justified.

The capacity of the Linacre plant varies somewhat with the liquor conditions, but a conservative figure is 3.5 mill. cu.ft. per day. It has recently been handling 3.8 mill. cu.ft. per day, but this is its maximum which will be reduced when the gas is fed direct to holders to the lower figure already given. A useful increase in capacity may be expected from additional or improved oxidation capacity.

The recovery of sulphur has been effected in a satisfactory way, and, provided effluent difficulties can be overcome, the plant is a self-contained unit.

Ammonia can replace soda ash quite satisfactorily in certain circumstances, and leads to a reduction in costs, but, so far, this has only been possible at Linacre during the winter months. If ammonia is to replace soda ash completely, provision must be made to recover the ammonia carried away in the oxidation air and, more important, the outgoing gas. The problem is, however, really one of temperature control, and cooling of the liquor in the oxidisers is the most satisfactory solution.

The plant is very sensitive to sulphur loading, and small day-to-day increases can best be taken care of by

G.J. No. 5026

J. M. Quigley, Gas Chambers and Coke Ovens, Ltd.; T. R. Howitt, W. J. Jenkins & Co., Ltd.; G. A. Anderson, Newcastle, Northern Gas Board.

G.J 5028

C. H. Davidson, R. & J. Dempster, Manchester; T. Biddulph Smith, Manchester, North Western Gas Board; L. G. Samways, Reading, Southern Gas Board.

the provision of some stand-by means of oxidation, such as an independent pump and ejectors. On the other hand, the plant responds quickly to a decrease in load, and, since the colour of the liquor gives ample warning of overloading, it is relatively simple to ensure that the cleanliness of the gas is maintained. The independent feeding of liquor to the first two towers and the last four is also a valuable safety factor, though it does not ensure the best use of oxidation capacity.

The costs of the process tend to be higher than for oxide boxes, but it possesses certain advantages over dry purification, among which can be listed the following:—

A saving of some 40% of ground as compared with boxes, and far more latitude with the layout of the vessels.

Capital costs are about half those for orthodox dry purification.

Low back pressure.

No call for air admission, and some 1% of carbon dioxide removed from the gas.

More rapidly erected.

A more congenial type of labour.

A purer sulphur is produced, which is obtained immediately.

Complete removal of cyanogen.

Control is largely unskilled.

Where surplus power is generated, such a plant could be operated in preference to returning power to the grid at small return.

The comparatively small difference in cost between a plant to purify to Gas Examiners requirements and a so-called 'scalping' plant is so small as to make the latter a doubtful proposition, except in special circumstances.

Perhaps one of the main drawbacks of the Linacre plant has been the difficulty of maintaining the air disintegrators in good order without shutting the plant down. These items are also driven independently of the main drive, and have no immediate stand-by in the event of electrical current failure.

As a result of experience at Linacre and elsewhere, there is no reason why a completely reliable plant without catch boxes could not be designed. A somewhat lower standard of purity than that obtaining with oxide boxes might have to be accepted with the plant running at full capacity.

Following presentation and discussion of the Productivity Team Report on Gas, which Team, led by Mr. J. H. Dyde, visited the United States in 1952, Mr. JOHN DRAKE, Managing Director, Drakes, Ltd., proposed an omnibus vote of thanks to all concerned in the successful outcome of the meeting, and the vote was seconded by Mr. JOHN CORRIGAN, East Midlands Gas Board.

Then Mr. J. T. HAYNES, President Elect, in moving a vote of thanks to the Retiring President, Mr. Currier, said that from time to time there had been outstanding events in the history of the Institution for which the ruling President had been responsible. He mentioned only one—Mr. John Terrace, who was President when they received the Royal Charter. The name of George Currier would be similarly remembered in the annals of the Institution because during his year they had been honoured by the Queen's Royal Patronage, and they had been privileged to enrol the Duke of Edinburgh as Honorary Life Member.

It was his privilege, on behalf of fellow members, formally to propose a vote of thanks to Mr. Currier for the added status which he had given to the Institution, for the success which had attended all the meetings —particularly the November meeting and now the Annual General Meeting —for the dignity with which he had conducted the business of the meetings, and, above all, for the happy fellowship which he had engendered throughout the whole industry.

Mr. G. E. ANDERSON, Chairman, North of England Section, who

G.J. 5033

T. W. Gibson, South Eastern Gas Board: R. S. Johnson, Deputy Chairman, South Eastern Gas Board.

seconded the motion, said that the Institution was now the proud parent of seven young and lusty District Sections, all of whom, with a typically juvenile disregard for the comfort and privacy of their elders and betters, had invoked from time to time the President's comforting presence and patronage in their internal activities, even to the extent of asking him to arrange his very busy programme so as to be in two places at one and the same time! Mr. Currier had been very indulgent to these demands and by attending their meetings had brought the spirit of the Institution to the provinces.

Mr. Haynes then presented to Mr. Currier the Presidential Certificate.

G.J. 4025

K. L. Clark, W. J. Jenkins & Co., Ltd., R. F. Rew, Exeter.

The PRESIDENT, in expressing his thanks, said that if he were asked what had been his outstanding experience during his year of office, which had been a wonderful experience, he would say that the one thing that had struck him throughout had been the kindness shown him by everyone; and they hoped that Mr. Haynes was going to have the same happiness and the same kindness in his year of office.

LOYAL ADDRESS

The following is the text of a Loyal Address sent to the Queen

May it please Your Majesty,

We, on behalf of all the members of the Institution of Gas Engineers desire, in loyal duty and affection, humbly to express to Your Majesty on the occasion of your Coronation our congratulations and heartfelt wishes that you may be blessed with health and happiness throughout a long, peaceful, and prosperous Reign.

Your Majesty has always shown a deep and personal concern for the health and welfare of your people. In its own sphere the gas engineering profession has ever striven to serve the community, from the pioneer days of the introduction of lighting by gas to the use of gas and coke in the domestic and industrial heating fields with the consequent reduction in smoke pollution of the atmosphere. Your beloved grandfather His Majesty King George V in 1929 gave great encouragement by granting to the Institution of Gas Engineers a Royal Charter. More recently, Your Majesty has been graciously pleased to confer upon the Institution of Gas Engineers the high privilege of your Patronage. In addition, His Royal Highness the Duke of Edinburgh has signally honoured the Institution by consenting to become an Honorary Life Member.

With our assurance that this Institution will always continue its work in the spirit of service for the common good, we beg to express to Your Majesty our constant and affectionate loyalty and we pray that Almighty God may sustain Your Majesty all the days of your life with health and strength to bear the heavy responsibilities of the Crown, and in the love of your own family and the devotion of all your peoples.

The Address was signed by G. E. CURRIER, President, J. TERRACE, Honorary Secretary, and W. T. K. BRAUNHOLTZ, Secretary.

The 1954 Annual General Meeting of the Institution of Gas Engineers will be held at Bournemouth from June 1 to 4

Benevolent Fund

MR. G. E. CURRIER, O.B.E., presided at the general meeting of the contributors to the Benevolent Fund of The Institution on May 20, and moved the adoption of the report and accounts. He said subscriptions and donations had increased during 1952, the total being £2,205; and the percentage of members contributing has again risen to over 50%. The Society of British Gas Industries had made a special donation of £25, and the district sections had made special efforts during the year.

The number of subscribers who paid subscriptions under deeds of convenant had increased to 653, and the income tax recovered amounted to £428, but there were still about 60% of the subscribers who do not make out the deed of covenant.

MR. A. MACFADYEN (Dunbarton) seconded the motion.

MR. JAMES CARR, O.B.E., M.C., proposing a vote of thanks to the Chairman, committee of management, and secre-

G.J. 5023

A. B. Seton, Willey & Co., Ltd.; J. D. C. Woodall, Maidstone, South Eastern Gas Board; K. Carey, Willey & Co., Ltd.

tary, said that Mr. Currier, during his year of office, had spent a great deal year of office, had spent a great deal of time in doing this job, and the increases were due in large measure to his probing efforts from time to time when the committee had met. He would like to endorse the Chairman's reference to the valuable help the district sections had given in improving the situation.

MR. H. MAYCOCK (Holywell and Flint), in seconding, said that to contribute as generously as possible to the Benevolent Fund was the duty of every member of the Institution. All of them should be not only givers, but cheerful givers, and if their contributions were made in that spirit, freely and liberally according to their means, they would not only afford happiness to those who, but for their help, would not achieve it, but for themselves experience the truth of the maxim that it was more blessed to give than to receive.

This was Coronation Year, a time of rejoicing, and he hoped that generous consideration would be given to the appeal that an endeavour be made to increase the number of subscriptions to the fund and the number of deeds of covenant.

The CHAIRMAN, speaking on behalf of the committee of management and the officers, said they were amply repaid by the increased income which had been received by the fund during the year.

DR. W. T. K. BRAUNHOLTZ, Hon. Secretary, reported that the ballot for two new members of the committee of management had resulted in the election of Mr. Bernard Clarke, M.B.E., and Mr. T. C. Finlayson.

Two New Honorary Members

The distinction of Honorary Membership was conferred during Institution Week on Sir George Evetts, Director of many former gas companies and one of the gas industry's outstanding constructional, administrative, and Parliamentary experts; and Dr. J. G. King, for nearly ten years Director of the Gas Research Board until the functions of the Board were taken over last year by the Gas Council.

SIR GEORGE EVETTS, O.B.E., M.I.C.E., has had a long and distinguished career in the gas industry, and few if any other men have served it over so wide a field. Educated at Masons College and at Birmingham University (where he was Chamberlain Scholar), he was for a time in the City Engineer's office at Birmingham and Westminster, and became assistant to the late Mr. Henry E. Jones and to Mr. Frank H. Jones. For 21 years a consulting gas engineer practising in Palace Chambers, Westminster, he became A.M.I.C.E. in 1908 and M.I.C.E. 14 years later. During the first world war he was works manager of the Explosives Loading Company's shell and mine filling factory at Faversham.

In the second world war Mr. George Evetts, who was created a Knight Bachelor in 1946, was Gas Adviser to the Board of Trade, Gas Division, and later to the Ministry of Fuel and Power. He was also Chairman of the Advisory Committee on Benzole Recovery, Assistant Director of Compressed Gases (Air Ministry), and became a Liveryman of the Worshipful Company of Wheelwrights and a Freeman of the City of London.

He has been engaged by many companies and local authorities from time to time in connection with constructional and administrative Parliamentary matters. His publications include 'Administration and Finance of Gas Undertakings' (1922), 'Gas Legislation' (1935), and various technical publications and contributions to the Technical Press.

His paper on 'The Economics of Gas Production on a Thermal Basis,' read at the annual meeting of the Institution of Gas Engineers in 1925 gained for him the coveted H. E. Jones London Medal. In 1933 he presented a paper to the Institution on 'Centralised Manufacture and Distribution of Gas in Belgium,' and during Mr. Frank H. Jones's Presidency of the Southern Association he gave a paper on tariffs. He was until recently Chairman of the Joint Committee on Rates of Depreciation appointed by the Gas Council.

Sir George, who became O.B.E. in 1943, three years before receiving his Knighthood, was a Director of many gas companies before nationalisation, and is still a Director of a number of British-owned overseas undertakings, including the Colombo and Hong Kong and China. Until it went into liquidation he was also a Director of the Malta and Mediterrean Gas Company.

DR. JAMES GRIEVE KING, O.B.E., A.R.T.C., F.R.I.C., who was appointed Director of the Gas Research Board in 1943, retired last year when the functions of the Board were taken over by the Gas Council. He is a native of Scotland, where he started his career as assistant to Professor T. Gray at the Royal Technical College, Glasgow, from 1912 to 1914. During the war years 1914-1918 he was chemist and later departmental superintendent to Nobel's Explosives Co., Ltd. (later part of Imperial Chemical Industries, Ltd.). He joined the staff of the Fuel Research Board as research chemist at East Greenwich in 1919, becoming chief chemist in 1920 and Superintendent in 1941.

The long list of his published researches includes a number of papers presented either alone or in collaboration at the autumn research meetings of the Institution of Gas Engineers. His joint paper with the late Engineer-Captain J. F. Shaw on 'Recent Experiments at the Fuel Research Station on Problems of Solid Smokeless Fuel' was awarded the Institution Gold Medal in 1934, and his joint paper with Mr. James Lamieson on 'Products Obtained by the Carbonisation of Scottish Cannel in Continuous Vertical Retorts' was awarded the H. E. Jones London Medal of the Institution in 1936.

Among Dr. King's earliest publications was a joint paper with Professor T. Gray on 'The Assay of Coal for Carbonising Purposes,' which described the now well-known Gray-King apparatus. One of his outstanding communications was the William Young Memorial Lecture which he gave at a meeting of the North British (now Scottish) Association of Gas Managers in September, 1937, on 'Flexibility and Balance in the Gas Industry.'

At that time chief chemist at the East Greenwich Station of the Fuel Research Board, Dr. King showed that if town gas were the sole product of the industry, as in the case of complete gasification, a measure of flexibility could be attained by extending the utilisation of gas through, for example, compressed gas or hydrocarbon synthesis. He thought it more promising, however, that the industry should become a solid fuel industry to a greater extent and by varying the proportion of many products to suit the immediate demand so balance its production as to achieve better results as regards maintenance of output at all seasons.

The New President and Vice-Presidents

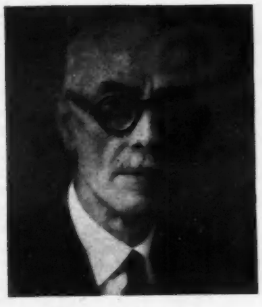
J. T. Haynes, President of the Institution, 1953-54.

W. T. Tate, Senior Vice-President.

W. K. Hutchison, Junior Vice-President.

THE 1952 INSTITUTION MEDALLISTS

THE presentation of medals was as usual an important feature of the opening session of the annual meeting of the Institution of Gas Engineers. The Institution Gold Medal was presented to W. A. Evetts, M.C., General Manager of the Watford Division, Eastern Gas Board, for his paper on 'Technical and Economic Aspects of the Gas Supply to Four New Towns,' presented at the 1952 annual meeting. The H. E. Jones London Medal was awarded to Captain (E.) W. Gregson, R.N.R., for the paper on 'Application of the Gas Turbine for Recovery of Waste Heat,' which he presented at the autumn research meeting last November. To D. C. Bertram, G.M., Station Engineer at the Southall works of the North Thames Gas Board, was presented the Institution Silver Medal for the paper on 'Post-War Developments at the Southall works of the North Thames Gas Board,' which he read before the London and Southern Section of the Institution in April, 1952. The Institution Bronze Medal was presented to T. Andrews, of the Liverpool Group, North Western Gas Board, for his paper on 'Consideration of Power Generation on a Gasworks,' which was read to his fellow members of the Manchester and District Junior Association of Gas Engineers in January of last year. For their paper on 'Town Gas High Temperature Radiant Heating in Industry,' presented to the London and Southern Junior Gas Association in November, the William Dieterichs Memorial Prize was presented jointly to D. J. Davies and F. W. Lockwood, of Watson House, North Thames Gas Board. The prize is awarded annually for the best paper dealing with the industrial application of gas delivered on any recognised platform in Great Britain.



W. A. Evetts, M.C.

Capt. (E) W. Gregson.

D. C. Bertram.

T. Andrews.

D. J. Davies.

F. W. Lockwood.

Possibilities of the Gas Industry

The Minister of Fuel and Power in Research Mood

THE President's Luncheon at the 90th Annual General Meeting of the Institution of Gas Engineers was held at the Savoy Hotel, London, on May 19, the President, Mr. G. E. Currier, in the chair.

The PRESIDENT, proposing the toast of 'The Guests,' said he was proud and pleased that so many who had earned distinction in such various spheres of life should honour the Institution by their presence at the luncheon.

They were, of course, delighted to have the ladies with them again, and he mentioned Dame Vera Laughton Mathews and Miss Halpin. It was particularly pleasant to welcome visitors from overseas. They had with them a very strong delegation from France, led by M. Kec and M. Ferlet, the President and President-Elect of the Association Technique de l'Industrie du Gaz en France. They had representatives of the German Gas Association; they had three representatives from the Italian Gas Association, one from the Netherlands, one from Norway (an old friend in the person of Mr. John Irminger), and Mr. Raeber from the Swiss Gas and Water Association. Last, but not least, they extended a hearty welcome to their own overseas members, Mr. Nicholson (Colombo), Mr. Thompson (Barcelona), and Mr. Tyndall (Hong Kong).

They were, continued Mr. Currier, also honoured by the presence of representatives of the Governments of the Dominions—Australia, Canada, and South Africa—the United States of America, Austria, Belgium, Denmark, Holland, Germany, Spain, Switzerland, and Japan. The President's Luncheon would not be complete without the presence of representatives of the Gas Council, and they were particularly pleased that they had with them the Chairman, Colonel Sir Harold Smith, the Deputy Chairman, Mr. Henry Jones, and no fewer than 11 chairmen of area boards. It was his pleasure to extend a special welcome to the Chairman and members of the North Eastern Gas Board, who had been so kind and so generous in their support during the last 12 months.

Educational and research establishments were represented by men of distinction in science and research. The whole of the gas industry would join him in welcoming them. Many were not members of the gas industry, yet all gave invaluable assistance in the education and training of their students and members and in giving the benefit of their experience by presenting papers on kindred subjects. Again, they were greatly honoured by the presence of the presidents, chairmen, secretaries, and other principal officers of a great number of kindred organisations.

It was gratifying, too, to have representatives from the Ministries of Education, Health, Labour and National Service, Works, and Housing.

Finally, he came to their principal guest, Mr. Geoffrey Lloyd, Minister of Fuel and Power. Before the war the Minister played a large part in preparing the country's civil defences. Later he became Secretary for Mines, and in that post and in subsequent ones he had control of the country's oil and petrol supplies, probably the most essential munitions of modern warfare. From 1940 he was in charge of one of the best-kept secrets of the war, the Petroleum Warfare Department. It was that Department which developed flame throwers and established the grid which supplied oil from the west coast ports to the aerodromes in the southern and eastern areas of the country, which pipeline was later extended under the English Channel to supply the advancing armies in France, Belgium, and Germany and which became known as Operation Pluto. His wartime tasks also included the development of the fog dispersal system known as Fido. The gas industry had long been trying to persuade the Ministry and the public to take a more active interest in fog prevention by smoke abatement. He hoped that the recently appointed Committee of Enquiry would bring speedy and effective action. They had been very disappointed in the gas industry to have their coal allocation cut by a million tons, which meant that they would have to use a much greater quantity of imported gas oil, and that inevitably meant greater cost to the consumer.

Mr. GEOFFREY LLOYD, M.P., Minister of Fuel and Power, who responded, said the policy of the Government was to encourage competition between the fuel and power industries. Therefore, it was very much allowable for the Minister to encourage each industry in the competitive effort in providing a better product for the consumer and better service for the consumer. He must say that anybody who had studied the development of the fuel and power industries in the last generation could not help feeling a tremendous admiration for the great counter-attack mounted by the gas industry in response to the new competition that came from electricity around the turn of the century. It was the fact, of course, that electricity had a considerable advantage in that it was at present able to use so freely the smaller coals which were increasingly produced by the collieries—a position in which the gas industry was not at the present time, a position which he was assured by the Chairman of the Gas Council and by others it desired to reach by the processes of research, and so on, notably by the blending of coals and perhaps by the even more interesting because more conclusive development of total gasification.

He would turn for a moment to the question of fog. From the point of view of coke the industry had a very good record and could put forward a very good case; but he had often wondered whether there was not another problem which was being masked for them. Smoke was a sign of inefficient combustion, but even when there was perfect combustion there were still products of combustion from sulphur. In gas they had a very strong position because by law the industry knew the requirements in regard to sulphur extraction. The gas industry had in this respect a strong position; the position would be strengthened further if the industry developed more in the gasification of coal.

Sir WAVELL WAKEFIELD, M.P., Chairman, Parliamentary and Scientific Committee, proposed the toast of 'The Institution of Gas Engineers,' suggesting that there might be some who had only a hazy idea of the Committee of which he was Chairman. However, since the work of that Committee affected all in his hearing directly or indirectly, it might not be out of place if he said a word or two about its activities, especially as the Institution of Gas Engineers was partially responsible at the beginning of the war for the getting together of a few Members of Parliament and Peers to make the Committee active.

The Parliamentary and Scientific Committee, continued Sir Wavell Wakefield, was an unofficial body composed of all parties, with a subscribing membership of Members of Parliament and Peers and the representatives of 76 scientific organisations. The purpose for which this Committee was set up was to enable scientists to explain to M.P.s what was happening in the scientific world and also to air their grievances—and indeed they did—and at the same time to enable M.P.s to explain to scientists what was or what was not practical politics in achieving what the scientists thought to be necessary. The result had been a beneficial and happy exchange of views.

And now for the Institution! 'With your membership of over 3,000 qualified persons and your long and distinguished record, it is, if I may say so, highly satisfactory that in this memorable Coronation year the Queen has recently agreed to become the Patron of your Institution. Again, the fact that the Duke of Edinburgh, whose interest in industrial and scientific organisation is so well known, has become an Honorary Life Member must also be a source of gratification to you.'

Mr. JOHN T. HAYNES, President-Elect of the Institution of Gas Engineers, responded to the toast. In doing so, he suggested that Sir Wavell Wakefield saw in the gas industry one taking full advantage of the opportunities which had been made available by the Gas Act of 1948. He saw the industry, thanks to the inspiration of Royal Patronage, imbued with the spirit of the new Elizabethan Age. He saw the industry interested and actively engaged in research for the more efficient processing of coal for the benefit of the nation. He had looked at the Institution of Gas Engineers and he visualised the Institution as a virile body of engineers, chemists, and technicians interested in their jobs and keeping alive that pride of craftsmanship on which the tradition of Great Britain had been built.

Dr. R. S. EDWARDS (Chairman of the North Eastern Gas Board) proposed the health of the President. He said: 'We in the North Eastern Gas Board were only too happy to assist in any small way we could, because we were intensely proud that after an interval of over 20 years the President of the Institution came again from Yorkshire. Mr. President, you do not like fulsome praise or anything that savours of flattery, but I want to say that a good President of this Institution is obviously a good gas engineer.

Mr. CURRIER made brief and adequate response.

PERSONALITIES AT THE PRESIDENT'S LUNCHEON, AT THE SAVOY HOTEL, FOR THE 90TH ANNUAL GENERAL MEETING.
THE INSTITUTION OF GAS ENGINEERS
G.E. CURRIER, O.B.E. The President.
J. KEC, President, Association Technique du l'Industrie du Gaz en France.
R. NEUMANN, President, Coke Oven Managers' Association.
The Chairman of the Gas Council, COLONEL SIR HAROLD SMITH, K.B.E., D.L.
Waiting his turn to speak, the old England "Rugger" Captain,
SIR WAVELL WAKEFIELD, M.P.
The Rt. Hon. GEOFFREY LLOYD, M.P. MINISTER OF FUEL AND POWER. The principal Guest.
JOHN T. HAYNES, President-Elect, Inst. Gas Engineers. HE SMOKES THE SMALLEST PIPE IN THE WORLD. OBVIOUSLY KEEN ON SMOKE ABATEMENT!
LORD FALMOUTH, Hon. Member, Inst. of Gas Engineers.
DR. R.S. EDWARDS, B.Sc., Ph.D. Chairman, North Eastern Gas Board.
MEL 53

Cartoon by Mel.

Institution Visits

Waddon: Source of Crawley New Town Gas Supply

SPECIAL interest in the Institution visits to the Waddon works of the South Eastern Gas Board on May 20 and 21 arose from the fact that during the previous week the supply of gas from the works to Crawley New Town was inaugurated, and one of the main items inspected was the beginning of a new 3½ mill. cu.ft. per day intermittent vertical chamber installation to meet the needs of the New Town.

During recent years, large extensions and alterations to the manufacturing plant have been carried out to meet growing requirements, and the works is, at the present time, capable of producing 26.3 mill. cu.ft. per day of town gas. This figure will ultimately be increased to 30.15 mill. cu.ft. when extensions now in progress have been completed.

The existing carbonising plant is accommodated in three separate retort houses. This site of the additional house was formerly occupied by a horizontal retort house, built in 1867 and reconstructed in 1920. A new section of intermittent vertical chambers, now being constructed by the Woodall-Duckham Co., will have a capacity of 3.25 mill. cu.ft. of gas per day.

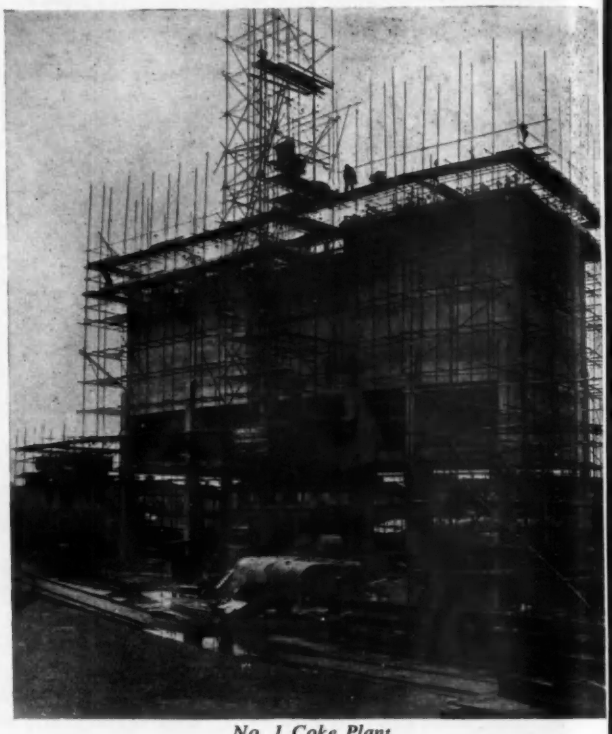
The bench brickwork consists of 36 chambers, arranged in six sets, each with its own built-in producer and recuperator. Provision has been made for ultimate conversion to mechanical producers if required.

The chambers are designed to carbonise Durham coals, and are built of silica. Coal will be delivered to this house in railway wagons on the existing high level sidings, and then unloaded by means of a 24-ton Strachan & Henshaw rotary wagon tippler into a receiving hopper. The coal will be fed by a drag bar feeder into two 24 in. by 36 in. British Jeffrey Diamond single roll breakers.

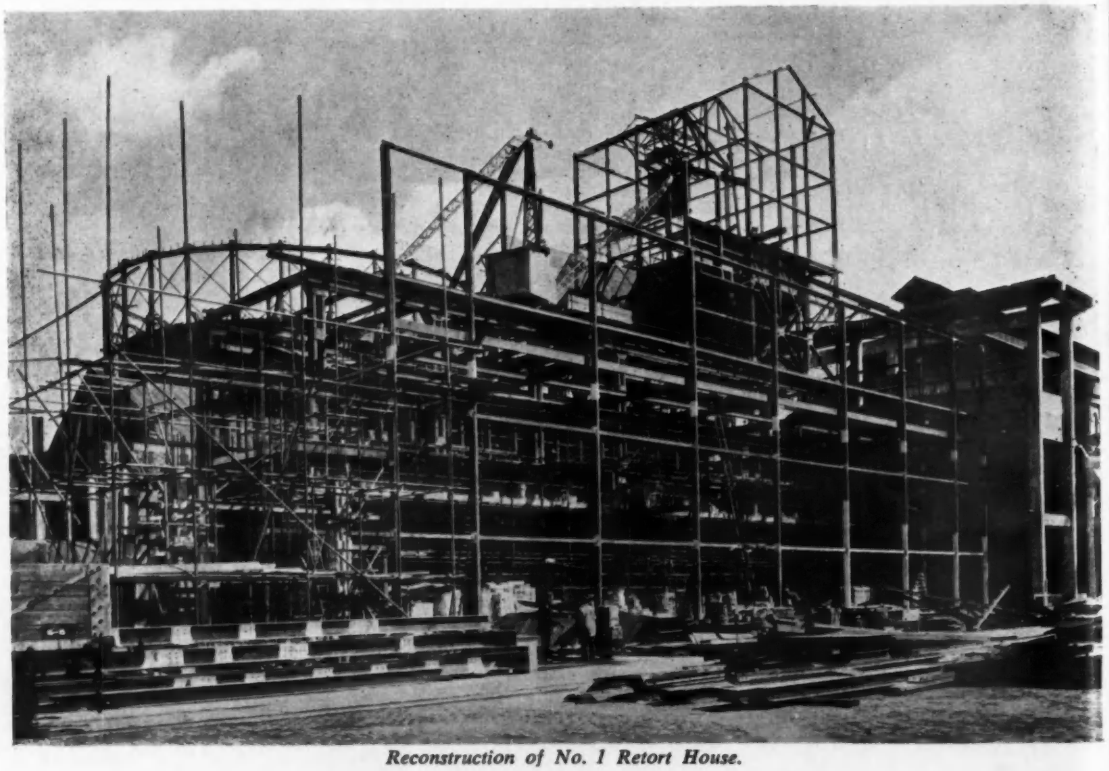
Coke will be removed from the new I.V.C. house to a new screening plant by means of an inclined belt conveyor, via a transfer tower. It is a reinforced concrete structure with reinforced concrete hoppers, and will house two Cort coke cutting and screening plants, each with an input capacity of 30 tons of run of retort coke per hour. The storage capacity of the hoppers is 880 tons, equal to approximately four days' make of coke and six days' make of breeze.

Anti-breakage spiral shoots will be provided for the individual compartments of the storage hoppers. All coke sold, whether for sack or for bulk loading, will be debreezed. A dust extraction plant will be incorporated, and this will be of the fan and cyclone type, in the central housing at the top of the storage bunkers. The C.W.G. plant comprises five Humphreys & Glasgow

Continued on p. 660



No. 1 Coke Plant.



Reconstruction of No. 1 Retort House.

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NHEAD (2 INSTALLATIONS) • BIRMINGHAM, NECHELLS (3 INSTALLATIONS) • BIRMINGHAM, SALTLE
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NE OUTH, POOLE (7 INSTALLATIONS) • BOW COMMON • BRADFORD (2 INSTALLATIONS) • BRECHII
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AM (2 INSTALLATIONS) • BURGESS HILL (2 INSTALLATIONS) • BURNLEY • BURNTISLAND (2 INSTAL
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R EXMOUTH (2 INSTALLATIONS) • FORFAR • FULHAM • GAINSBOROUGH (2 INSTALLATIONS
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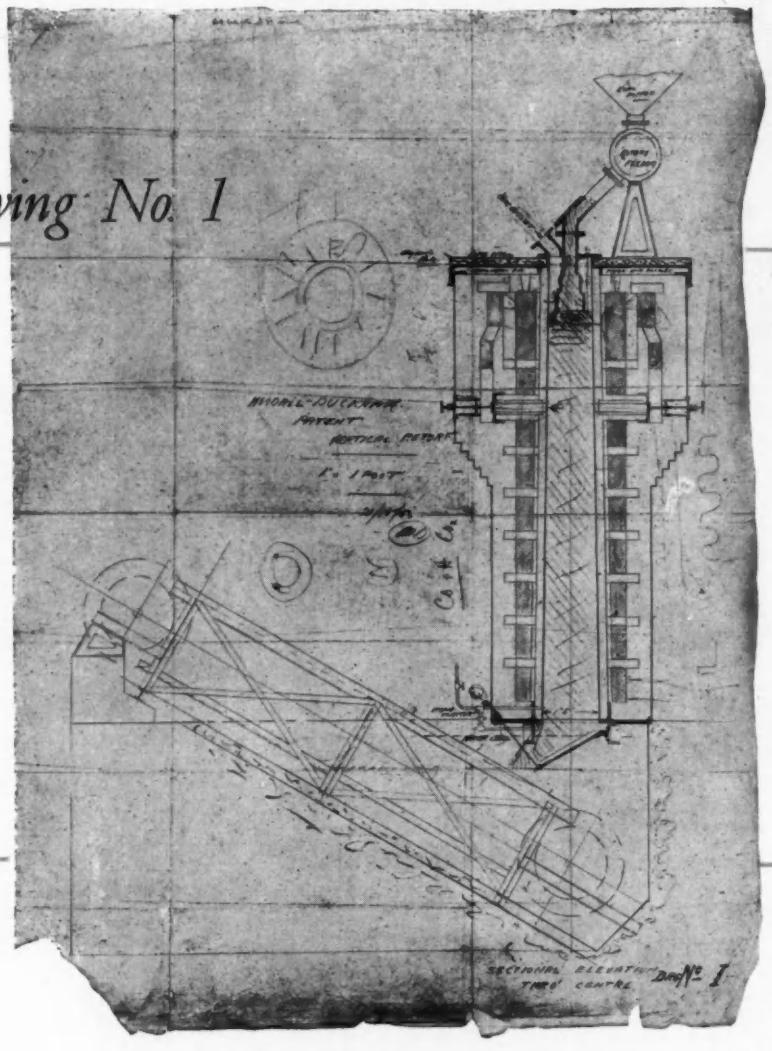
WD

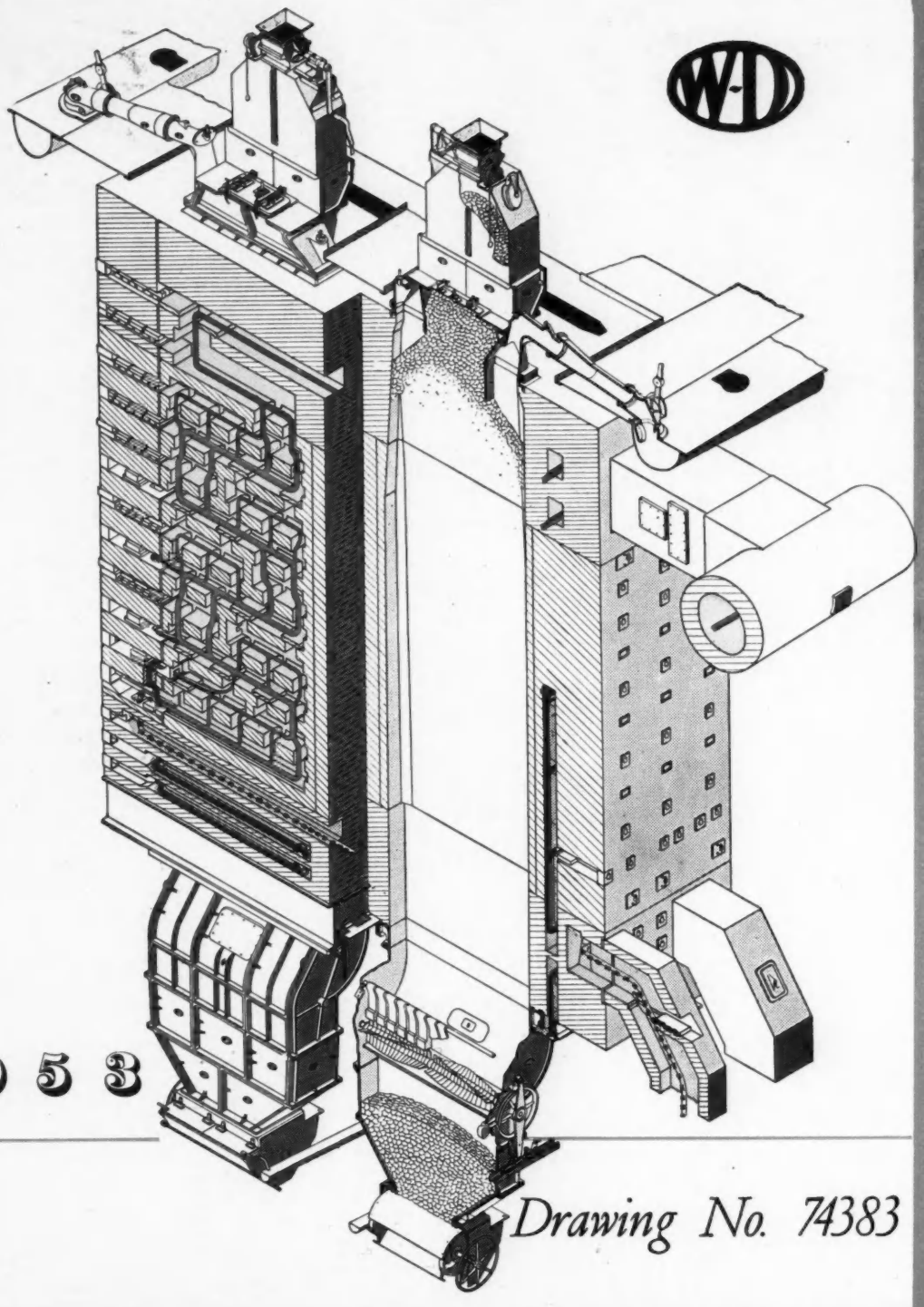
50 YEARS COAL CARBONISATION



FROM 1903 TO .19

In 1903 the first patent concerning the W-D Continuous Vertical Retort was taken out and the first drawing produced. The first commercial plant was constructed at Bournemouth in 1906 and carbonised 20 tons of coal per day.

Today, Continuous Vertical Retorts produce more gas for the British Gas Industry than any other type of carbonising plant. Over 7 million tons of coal are carbonised annually in W-D Continuous Vertical Retorts.



1953

Drawing No. 74383

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Meter Manufacturers' Modern Methods

A Look Round Smith Meters Streatham Works

THE visit of the members of the Institution to the Streatham works of Smith Meters, Ltd., on May 20 gave them a glimpse only of one aspect of the company's activities, the manufacture of meter components. To have grasped the importance of all the contributory factors in the successful operation of meter manufacture it would have been necessary to visit not only each of the works but all the departments of Smith Meters—the research laboratories and the design and administrative offices.

What the visitors saw at Streatham is characteristic of the activities throughout Smiths—skilled craftsmanship, first class engineering, stringent testing, and a teamwork and organisation that are second to none.

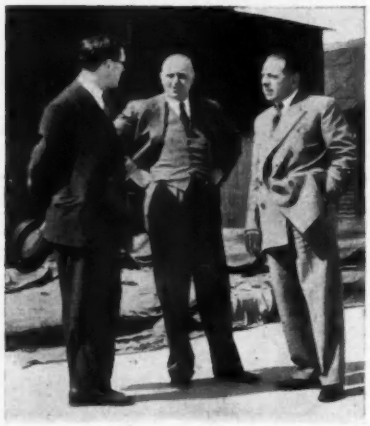
Smiths began manufacturing gas meters as long ago as 1834. In those adventurous days, the staff totalled 25. Today, it is over 1,500, of whom 1,100 are employed at Streatham. The other factory at Kennington is employed on assembly of tinplate meters, and the manufacture of the die-cast meter.

Immediately after the last war, the demand for the company's peace-time products was instantaneous. Switching from war work which constituted over 95% of the potential output, the company equalled its pre-war record within 12 months. In one year, output exceeded the pre-war record by 88%. This manufacturing programme means that one meter is completed every 45 seconds of the working week.

No one will question the need for precision in the manufacture of meters that are to be capable of consistently accurate registration. Much, therefore, depends upon the tools used. During the visit members saw the tool room, press shop, automatic machine shop, general machine shop, plastic moulding department, processing department, assembly department, and inspection department. From these departments the flow of various components was seen through their every stage of manufacture and inspection. Also a visit was made to the electrical meter division, where the assembly of both credit and prepayment electricity meters was seen.

In these departments a full range of equipment was working. It has been the Smith policy for many years to control the manufacture of gas meters from the raw material stage to the finished product. There are very few items which are brought from outside suppliers, and consequently there is complete control of the quality of all components used in the manufacture of meters today. A special department is devoted exclusively to the thorough examination of materials and finished components. Every consignment of material is tested as soon as it enters the works. Costly equipment, trained personnel, and considerable time and patience have all to be accounted for, while the number of rejects is very small. The inspection department plays a significant part in the organisation, and at every stage of manufacture the inspection organisation ensures constant checking of the manufactured articles. In the general machines shop was seen the Smith application of quality control, whereby a given percentage of every part manufactured is inspected at the time of manufacture in order that machining operations are held rigidly to the manufacturing limits imposed.

Among the salient features which are accepted principles in the gas meter industry today Smiths were the first to introduce radial valves, anti-corrosive bearings, consumers' optional coin prepayment mechanisms, the open top type of meter, totally enclosed gear boxes, and the size of meter subsequently adopted in I.G.E. Communication No. 319.



A. G. Higgins, Assistant Secretary of the Institution, with Norman Smith, Chairman, and F. W. King, Director, of Smith Meters, Ltd.

The spotless white-coated guides to whom much of the success of the visit was due.

This display attracted much attention during the tour of the works.

The Luton Production centre of Radiation Group Sales, Ltd.

Institution Members Visit Radiation Ltd., at Luton

ONE of the most popular of the Institution Week visits was that on May 21 to what is now the Luton Production Centre of Radiation Ltd., more familiarly known as the works of the Davis Gas Stove Co., Ltd., a company which had its origin in the purchase in 1868 of an ironmongery business at Camberwell by the brothers Henry John and Charles William Davis.

In 1919, the company combined its resources with John Wright and Eagle Range Co., Ltd., Birmingham, and Richmonds Gas Stove and Meter Co., Ltd., Warrington, and Radiation Ltd., was formed as a holding company, the associate firms retaining their separate identities. Although now a unit of a very large organisation the company has retained the best traditions of a family business which, since the death of Harold Davis in 1937, have been carried on by his son Mr. Kenneth Davis.

Current production is concentrated on the latest models of Radiation domestic cookers, principally the New World Eighty-four, the basic design of which was developed in the company's design and development department.

The factory was erected on its present site in 1905-6 and when completed was regarded as being one of the most up-to-date in the country. With the passing years the buildings were altered, added to, and changed in countless ways to keep abreast with the march of progress, but in the late 1930's complete rebuilding was decided upon.

On the west side of the works the foundry and press shop areas have been completely rebuilt and to a large extent re-equipped with new plant, operated under modern methods and production techniques. The next major phase planned was the rebuilding and development of the enamel shop area, but to date it has not been possible to obtain a building licence, and ever-increasing demands for greater output of enamelled components have forced a compromise solution. This has been resolved by adapting the 45 years old building for the installation of modern plant designed to mechanise every stage of the vitreous enamelling process. This project is well advanced with the section devoted to enamelling sheet steel components already fully mechanised.

Similar compromise solutions for the overall modernisation of the cooker assembly areas are also planned, pending the day when it will be possible to go ahead once again with complete rebuilding.

The nature and layout of the buildings generally prohibits extensive conveyor movement of materials from one section of the factory to another, and has led to the introduction of a variety of methods of mechanical handling, all having the common objective of reducing to the minimum wasteful manual movement of materials.

Mechanical materials handling methods include the use of power and gravity conveyors, mechanised assembly tracks, the use of a fleet of fork-lifting and internal transport vehicles, mechanical stackers, elevators and other devices. In conjunction with these, pallets and work stillages have largely outmoded the previously universal hand-propelled bogies or trolleys.

The work of the technical department is primarily the design and development of gas appliances, but it also embraces other functions. Close collaboration is maintained with Radiation Central Laboratories at Birmingham and with Radiation Technical Service Department, through the representatives of which the closest contact is maintained with gas boards on matters affecting performance, design, and development of the company's products in use, and also with market trends likely to influence design of new appliances.

An important function exercised by the technical department is the checking of samples of works production to ensure that the standards specified are maintained. Appliances are withdrawn from the production line at frequent intervals and are subjected to examination and scrutiny covering every point of construction and performance.

The total melt in the foundry during a normal week is 160 to 170 tons and metal is poured into some 15,000 moulding boxes. The foundry buildings were reconstructed in accordance with the recommendations contained in the Garrett report.

The pattern shop is particularly well equipped and is fully able to deal with any problem likely to be encountered in the making of wood or metal patterns, and the manufacture of plate patterns for the mechanised moulding plant. Many thousands of pattern plates and working patterns have been made in the course of the years, any one of which must be available at short notice if only to maintain the cooker spare parts service.

— see the 'New World 84' in production

Castings are made both 'on the floor' and on mechanical moulding plant.

Four cupolas, arranged in pairs, supply molten metal to the foundry. Each pair consists of a large and a small cupola, and each pair is brought into use on alternate days.

The press shop is planned for the batch production of sheet steel components on a product layout basis. This enables sheet steel to be cut, blanked, formed, machined and fabricated into finished components ready for enamelling.

The total output of the section averages about 100,000 pieces in a normal working day. On the larger presses as many as four tools may be ganged up for simultaneous operation. Female operators are employed, in some cases on presses up to and including 40 tons capacity.

Safety precautions are especially stringent in this section and include swing and side guards on the large machines and fixed interlocking guards on the smaller machines. Static guards are used wherever the operation does not permit the use of a fixed interlock guard.

Movement of materials from the press shop is mechanised to the greatest extent possible, bearing in mind that it is not practicable to install a conveyor belt system.

The enamel department is equipped for the manufacture of vitreous enamel from the raw material state to the finished enamel, whether for application to cast iron or to sheet steel, but at the present time enamel frit is supplied from the Radiation enamel making factory and only the mixing and milling is carried out for the production of enamel slurry. The vitreous enamelling process is in fact the application and fusing of a thin sheet of coloured glass to sheet steel or cast iron components. This inherently temperamental process is made more difficult by the extreme hardness and acid resisting qualities required for the enamelled finish of gas appliances in this country.

Weekly production schedules determine the type and quantity of cookers to be assembled and ensure that the correct quantities of factory finished components are available in the feeder stores and that adequate supplies of bought-in parts are held in the general store. Assembly of cookers is largely concentrated on the New World domestic cooker, the Eighty-four.

All sub-assemblies and parts are fed to pre-determined positions on the main assembly conveyor to enable the sequence of cooker assembly operations to proceed smoothly. In addition to the final assembly of cookers, further tests are carried out on the conveyor, including an air drop test of the complete gas rail and oven supply system and a gas combustion test for rating and adjustment of burners.

Two inspection points cover the cooker assembly and the finish of the components. Cookers which do not pass assembly inspection are taken off the conveyor for individual attention; defective or damaged components are replaced.

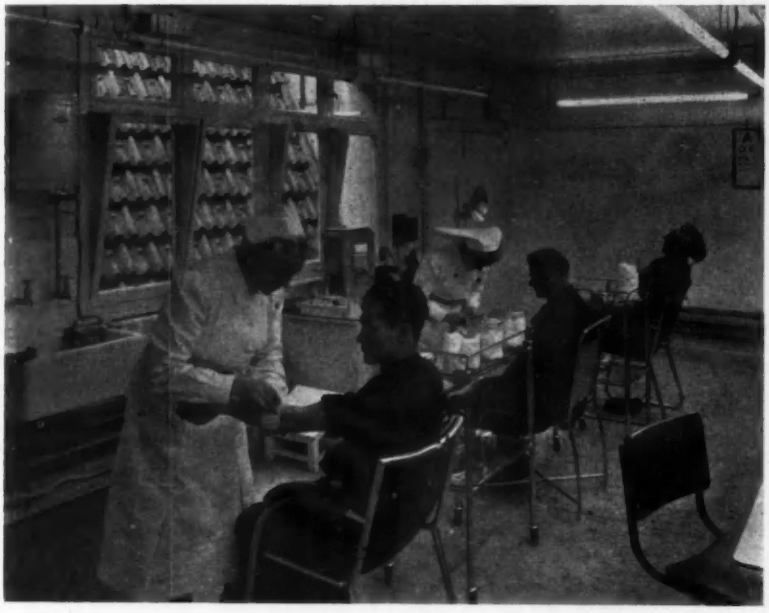
The assembled cookers are cleaned and wrapped ready for immediate dispatch before being taken off the end of the conveyor. A limited number of cookers of cast iron construction are assembled on a small feeder conveyor conecting with the main conveyor, to

Oven assembly and insulating section

Fusing of finish coat enamel in the continuous furnace

Assembly conveyor for New World Eight-Four cookers

Core making in the foundry



In the works surgery.

which they are passed for inspection and wrapping. These cookers are made to meet the requirements of certain export markets. A larger cooker, the AV. 89, designed for small boarding-house and restaurant requirements, is assembled on the floor of the assembly department. The company attaches great value to the work of the surgery, which is designed to serve two main purposes, the provision of full medical facilities, services of the works doctor, etc., to maintain a high standard of general health among employees, and the provision of facilities for the treatment of accident injuries. The surgery, staffed by the works medical officer, a fully qualified sister and nurses, is open day and night throughout the normal working week. An eye specialist holds a weekly clinic in the surgery and a chiropodist is in attendance during two days of the week.

With regard to accident prevention, the broad policy of the company is: (i) to comply fully with all the requirements of factory legislation so that positive preventive measures for avoiding accidents are applied wherever practicable; (ii) by education and training to cultivate in all employees a safety sense and an acceptance of personal responsibility for preventing accidents. Responsibility for implementing this policy rests with the safety engineer.

The works canteen is managed by the company and provide wholesome meals for employees of all grades. It is subsidised to keep prices at the lowest possible level and additional facilities are given to young employees to purchase weekly tickets enabling them to partake of a daily main meal at a nominal charge. Hot meals are available for night shift as well as day workers.

Employees are encouraged to take an active interest in the affairs of the company through a system of joint consultative committees, representing all members of the organisation. The sectional committees, together with members of the senior management, form the works council which, with the Managing Director as Chairman, meets regularly to discuss matters of interest affecting the organisation as a whole. Importance is attached to the recruitment and training of young people. Within the company their activities are largely co-ordinated through the apprentices association.

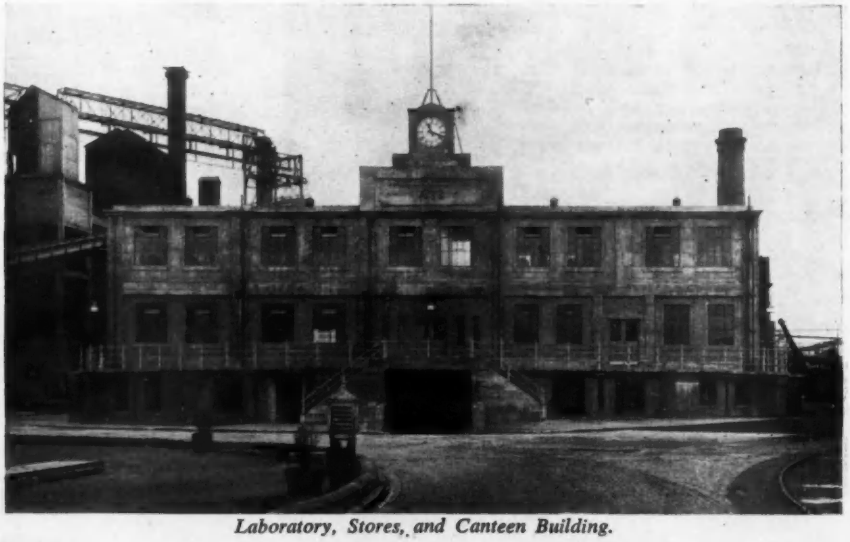
VISIT TO WADDON GASWORKS—Continued from p. 652.

fully automatic hydraulically operated sets of the back-run type, with self-clinkering grates. The total capacity is 15 mill. cu.ft. per day. Each set is fitted with a waste heat boiler and a generator boiler as an integral part of the installation, so that the whole plant is self supporting for process steam.

Large coke for C.W.G. production is obtained from the nearby screening plant, and is conveyed by rubber belt to the overhead storage hoppers adjacent to each set.

To meet the extra demand for current which will be required in connection with the new retort house and coke plant, the power house is being augmented by the addition of mercury arc rectifiers of a capacity of 250 kW.

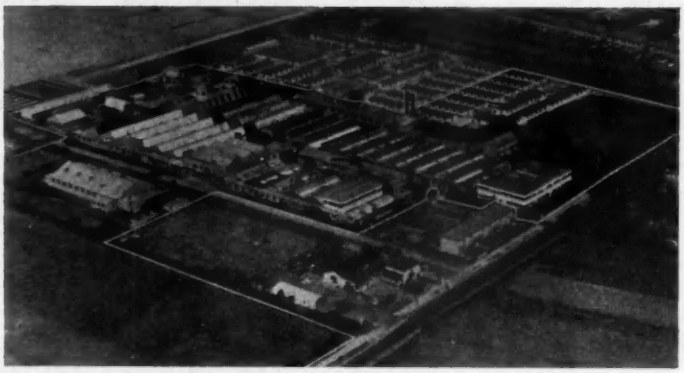
The total capacity of the four gasholders at Waddon works is just over 10 mill. cu.ft. The holders are all of the column guided type, the largest having a capacity of 6.5 mill. cu.ft.



Laboratory, Stores, and Canteen Building.

There are three holder stations on the Croydon system, situated at Carshalton, Whyteleafe, and Oxted, containing an additional four holders with a combined capacity of approximately 2 mill. cu.ft. A new spiral guided holder by R. & J. Dempster, of 2 mill. cu.ft. capacity, is nearing completion at Whyteleafe.

Two Bryan Donkin Rateau boosters supply the gas required for the trunk mains on the district, including the main to Crawley New Town. It is proposed to modify the booster house at an early date, to install steam condensing plant and to add two further steam-driven boosters of 275 B.H.P., each having a capacity of 500,000 cu.ft. per hour at a pressure of 5 lb. per sq. in., to meet increasing consumption in the Crawley and East Surrey areas. In the middle yard at the Waddon works is a site (formerly occupied by a gasholder) which has been adapted to provide a general and spare part store below ground level. The stores building houses a fully equipped laboratory where all the usual gasworks tests are carried out, also adequate washing and changing rooms for employees.



Aerial View of Sunbury-on-Thames Works.

Visit to the 'TEDDINGTON' GROUP OF COMPANIES

Sunbury-on-Thames

ON Wednesday afternoon, May 20, members of the Institution and their ladies visited the Sunbury-on-Thames works of the 'Teddington' Group of Companies. Commencing with the formation of the British Thermostat Co., Ltd., in 1928, the 'Teddington' organisation has developed during the last 25 years into the largest industrial undertaking in Europe entirely devoted to the manufacture of automatic control equipment, and the group now comprises the British Thermostat Co., Ltd., Teddington Controls, Ltd., Teddington Industrial Equipment, Ltd., and the Société Française des Thermostats.

The visitors were split up into small parties, and well-known automatic controls such as those used for refrigerators, cookers, and electric irons were seen from the manufacture of the component parts right through to final assembly. Visitors were impressed with the amount of detailed and intricate work which went into each piece of apparatus.

Automatic controls have become increasingly important in practically all branches of industry, and the advantages to be gained from their use in the saving of labour and fuel, the elimination of waste and the improvement in the product being processed, are now so widely recognised by progressive engineers that today there is no major industry in which the 'Teddington' range of controls for temperature, pressure, humidity and liquid level regulation, is not used.

Manufacturing Facilities

The main plant at Sunbury-on-Thames is contained in a group of large modern buildings laid out for all types of production. Included is one of the largest and best equipped plants in the United Kingdom for the production of flexible seamless metallic bellows which form the operating element in most types of automatic temperature or pressure controls. They are made in a wide variety of materials in many different sizes from strip metal, by a process unique in this country. To meet the demand for a large volume of all kinds of machined components required by the assembly departments, each of the 'Teddington' Companies has its own Machine Shops featuring a complete range of standard and specialised machine tools. A moulding department has recently been established to cater for the various moulded plastic components used in the range of controls for domestic appliances, and with the modern trend to embody moulded parts wherever possible, this section is rapidly expanding.

In line with the 'Teddington' policy of meeting industry's growing demands at the most competitive prices, practically all the parts needed for the production of our very wide range of equipment is processed within the organisation, which is thus dependent for very little, other than raw material, on outside sources. For this reason, at Sunbury-on-Thames, there is a full complement of ancillary shops, including electro-plating and metal polishing departments, sand and shot blasting plant, a paint spraying section, spring winding plant, press shops, and tool and standards rooms.

Design and Development

It will be readily appreciated that the subject of automatic controls is extremely wide and complex, necessitating a large body of specialised knowledge and experience, not only of the techniques involved in the manufacture of the controls themselves, but also of the many and varied processes to which they are applied. That is why centralised development and engineering departments have been established, incorporating design offices, drawing offices, experimental and proof production shops, physical, chemical, metallurgical and electronic laboratories, together with a central technical library and quality control section.

The Group employs some 2,250 people and has a total floor space of 300,000 sq. ft. To meet the continually growing demand for its products, further substantial extensions are now under construction.

The Group is represented by agents in most overseas territories and it has regional offices in London, Birmingham and Nottingham.

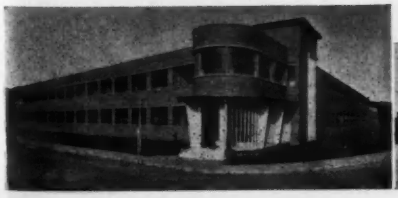
Products and Services

The British Thermostat Co., Ltd., manufactures a complete range of controls for domestic and commercial refrigerators, gas, solid fuel and oil burning appliances, electric room and water heaters, thermostats for motor vehicle cooling systems and packless shaft seals for all applications; while Teddington Industrial Equipment, Ltd., concerns itself with automatic control equipment for heating, ventilating, air conditioning and industrial process applications. This Company also undertakes the development of complete control schemes and offers a supervisory installation service for this equipment.

Teddington Controls, Ltd., specialise in automatic controls and precision equipment to meet the highly exacting conditions of temperature, pressure and vibration met with in modern aircraft, and special equipment to cater for these requirements is featured in the Company's plant.

Owing to difficulties in importing controls from England, the Société Française des Thermostats, with works at Paris, was organised to manufacture some of the more popular 'Teddington' instruments on the continent of Europe. A large part of the refrigeration controls used in France and the surrounding countries is produced at this works and new types of controls are being introduced continuously as the organisation expands.

After an extensive tour the visitors were entertained to tea in the Company's canteen. A hearty vote of thanks was proposed by Mr. Kenyon, to which Mr. E. Burnham, Managing Director of Teddington Industrial Equipment, Ltd., responded.

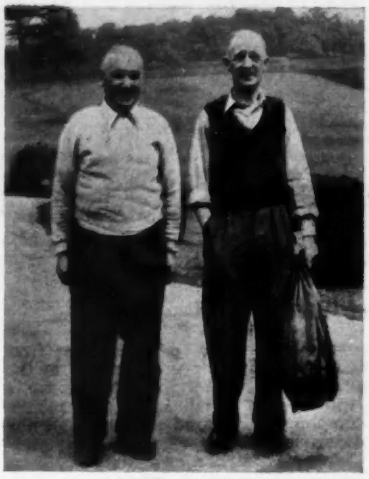


Left: *The 'Teddington' factory in Wales.* *and* **right and below** *two of the Sunbury Factories.*

Golf

THE S.B.G.I. ENTERTAINS THE I.G.E. AT EPSOM MAY 18

'GJ' 5008



'GJ' 5006

'GJ' 5007

'GJ' 5005

'GJ' 5002

'GJ' 5003

'GJ' 5001

'GJ' 5009

G.J.5014

The Thornton Cup for J. Pickup Smith.

G.J.5012

S. C. Thomson and J. D. C. Woodall.

THIS YEAR'S SUMMER MEETING took place on the Monday of Institution Week at the R.A.C. Country Club, Woodcote Park, Epsom. The Society was honoured by the presence of the President of the Institution—Mr. G. E. Currier, O.B.E.—who was kind enough to present the Coronation Plate at lunch time. The results were as follows:—

THORNTON VICTORY CUP.

1. J. Pickup Smith 72. 2. B. Pollard 74.
3. S. C. Thomson 74. Hidden Prize, R. E. Mitchell.

CORONATION PLATE.

1. J. W. Denton 76. 2. C. Johnson 76.
Hidden Prize, D. D. Burns.

DAVIS CUP. S. C. Thomson 81.

VISITORS. A. Sadler 79. Hidden Prize, G. Wood.

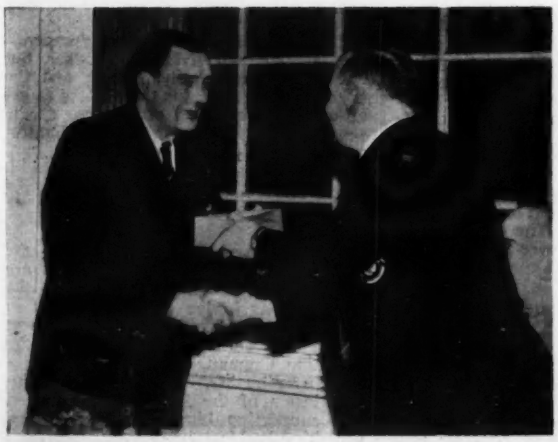
FOURSOMES.

1. J. B. Clay and W. Oldham 3 down.
2. C. H. Chester and W. H. G. Roach 5 down.
3. J. D. C. Woodall and S. C. Thomson 6 down.

The Captain, Mr. Francis Drake, mentioned that he was supported by five ex-captains and much good work behind the scenes. His most pleasant task of the day was to present to Mr. Ronald Edgar six inscribed solid silver ashtrays for many years of valuable service to the Society.

G.J.4816

The Davis Cup for S. C. Thomson.



G.J.5019

W. Ronald Edgar was presented with a set of solid silver engraved ashtrays as a souvenir of many years of devoted work for the S.B.G.I. Golf Circle.

G.J.5018

Left to right: Brig. C. A. H. Fairbank, O.B.E., M.C., T.D.; Francis Drake (Captain of the Circle); George Currier, O.B.E. (President, Institution of Gas Engineers); J. W. Denton, G.M. (winner of the Coronation Plate); C. T. C. Woodall (Hon. Secretary).

OTHER INSTITUTION WEEK VISITS

On earlier pages we have described some of the principal visits during Institution Week. Below are brief reports of the other visits, including the all-day river trip on May 22.

BCURA

The British Coal Utilisation Research Association left no stone unturned in its effort to welcome the 160 Institution members who visited its Leatherhead Research Station on May 20. For the purpose of the visit all investigations carried on in the Association had been classified into one or more of eight groups. These were: Fuel efficiency; utilisation of low grade fuel; correct choice of fuels; atmospheric pollution; use of coal other than as a fuel; fundamental nature of coal; research services; and instrumentation.

Each of the laboratories or departments dealing with these investigations was clearly signposted for visitors' guidance, and after a brief conducted tour, members were at liberty to enquire further into whatever branch of coal research they chose.

Present with the visitors were the Chairman of the Gas Council, Colonel Sir Harold Smith, and the Deputy Chairman, Mr. Henry Jones. Mr. Jones, responding to the welcome offered to visitors by Sir Charles Ellis, F.R.S., President of BCURA, and himself speaking as a Member of Council of BCURA, described how, a year or more ago, the Gas Council had decided to become a substantial subscriber to the Association. Sir Harold also commented on this relationship, pointing out that the ability of three nationalised industries to join forces with the manufacturers, and also with the participation of the Government, augured well for the future of research. It was, he said, a fine example of how different bodies could work together towards a certain objective.

Other remarks were made by Dr. D. T. A. Townend, Director General of BCURA, and the President Elect of the Institution, Mr. J. T. Haynes, who expressed the appreciation of the visiting members, and testified to the value of the Association's work to the gas industry.

BANKSIDE

An interesting insight into the mysteries of electricity generation was afforded visitors to the Bankside Power Station of the British Electricity Authority on May 21. The only power station in this country designed for the exclusive burning of oil, Bankside 'B' holds a unique position in this country. Ultimately, the station will have a total capacity of 240 MW, but only half of the project has as yet been authorised, and the present plant consists of two 60 MW B.T.H. turbo generator sets and four 375 k. lb./hr. Foster Wheeler boilers. The boilers are single-drum natural-circulation units with water-cooled combustion chambers, primary and secondary convection superheaters, plain tube economisers and primary and secondary air heaters. There are twelve oil burners per boiler, and each burner is provided with a pilot gas igniter.

The proximity of the station to St. Paul's Cathedral and the high sulphur content of the fuel have made flue gas washing obligatory. The gas-washing plant, which is not yet completed, consists essentially of a cast iron washing chamber packed with timber scrubbers, which are sprayed with water through ebonite nozzles. The washed gases are finally passed to atmosphere through nozzles at the top of the chimney, the washing water being subjected to treatment with chalk slurry and aeration with compressed air, before being returned to the river.

LONDON AIRPORT

Also on May 21 Institution members and visitors were given an opportunity for touring London Airport with close-up views of the regular life of the airport. Among the features examined were the marshalling apron, runways, hangars, and a diversity of aircraft. In addition visitors were able to arrange to make short passenger flights. While tea was served in the enclosure, the visitors were entertained by a running commentary on the aircraft arriving and departing.

FESTIVAL HALL

Although the gas-fired heating system at the Royal Festival Hall has been well publicised in the gas industry, there are still many who have not had an opportunity to study this installation on site. Since May 21 this number has been reduced, for a number of I.G.E. members visited the Hall on that day and, in addition to seeing the five 'Cochran' vertical boilers, supplying hot water for the plenum plant and the three 'Cochran' boilers supplying hot water for the kitchens and cloakrooms, the visitors were afforded an opportunity of inspecting the well-known heat pump which can operate for the provision of heat or as a cooling plant.

BRIGGS MOTOR BODIES

Institution members visiting the Dagenham Works of Briggs Motor Bodies, Ltd., on May 20 were able to see a variety of interesting operations. Among these were car body stampings from power presses, sub-assemblies, chassis manufacture, body framing and assembling, door assembly, spray painting, trim and upholstery manufacture and assembly, ammunition box assembly (including aluminium metal spraying), 4-gal. petrol containers assembly (Jerricans), shipping and export packing. It was interesting to note that all prime and undercoat ovens were gas heated, and for the small parts paint oven infra-red heating by gas was used. The consumption of gas at this plant is over 3 mill. cu. ft. per week.

BUILDING RESEARCH

The Institution visit on May 21 to the Building Research Station at Watford embraced five of the divisions in which the station is organised. The two Chemistry Divisions were those dealing with the deterioration of concrete and the corrosion of metals, etc., and also production of bricks from mixtures of pulverised fuel ash and clay.

The sections in the Engineering Division visited included those studying reinforced and pre-stressed concrete and the heavy test laboratory in which large structural elements are tested to destruction. The Soil Mechanics Division, which is concerned with the testing of soils and foundation design, came next, and last—and perhaps of greatest interest to the visitors—the Architectural Physics Division, in which heating research is largely carried out in the field, although certain aspects are studied on test buildings.

UPPER THAMES VALLEY

After the strenuous three days of the meeting, members and visitors had pleasant relaxation in the form of a tour of the Upper Thames Valley, visiting Marlow, Maidenhead and Windsor.

Three well filled coaches left Belgrave Square for a pleasant and uneventful drive to Marlow. Uneventful that is until at Marlow Bridge the problem arose as to how to get a seven-ton load over a 'Five-Ton Limit' bridge. However, while those in charge were conferring as to how to overcome the difficulty, the passengers took the law into their own hands and walked the half mile down to the river, where a motor launch was waiting to take them the next stage —downstream to Maidenhead, past some of the loveliest of the English countryside, its beauty enhanced by brilliant sunshine.

Lunch was served at the Riviera Hotel at Maidenhead, and was graced by the presence of the Mayor and Mayoress of Windsor and the Mayor and Mayoress of Maidenhead. Mr. G. E. Currier proposed the Queen's health, which was followed by a few words of welcome from the Mayor of Maidenhead.

Mr. J. H. Steinkamp, Managing Director of the Haarlem Gas and Power Works in Holland, spoke on behalf of foreign friends in praise of the excellent preparations made for them in London throughout the meeting, and proposed a toast to the Institution of Gas Engineers and to the prosperity of the gas industry all over the world.

Unfortunately, rain slightly dampened the last lap—up river to Windsor, but tea was served on the launch and the sky cleared in time for the visitors to get an awe-inspiring view of Windsor Castle —an appropriate finish to a delightful and excellently organised excursion.

ABOUT 160 members and guests of the Institution of Gas Engineers who are Freemasons gathered at a meeting of the Evening Star Lodge on the Monday in Institution Week. The proceedings at Freemasons Hall and the dinner in the adjoining Connaught Rooms were presided over by Mr. A. L. West, Worshipful Master of the Evening Star Lodge, and supporting him were Mr. J. Pee, Worshipful Master of the Murdoch Lodge, and Mr. W. B. MacLusky, Worshipful Master of the Northern Star Lodge. The principal speaker at the dinner was Sir Frederick Rowlands, a former Lord Mayor of London.

Ladies Visit to the R. A. C. Country Club, Woodcote Park, Epsom (May 20)

G.J. 5077

G.J. 5075

G.J. 5073

G.J. 5070

G.J. 5074

G.J. 5076

G.J. 5071

G.J. 5069

Abstract of I.G.E. Communication No. 424

S. K. HAWTHORN, M.I.C.E., M.I.MECH.E., Engineer,
Birmingham Division, West Midlands Gas Board.

Special features of the New Swan Village Gasworks

THE planning and construction of a completely new gasworks offers opportunities for not only incorporating individual items of plant of the latest design, but also of planning a layout and introducing special features and methods of operation that together will make for maximum overall efficiency, minimum costs of production, and the very best working conditions for the operatives. The choice of plant and layout must always be an individual problem to suit such local conditions as the peculiarities of the site, the environs of the works, the type of coal available, railway facilities, water and power supplies, means of disposal of effluents, the need to interlink with other works, seasonal variations in demand, and load factor.

In the case of the new Swan Village works, the site is only 11 acres in extent, and there is no possibility of further adjacent land becoming available. The site adjoins the old Swan Village works, but is separated from them by a public road. The close proximity of the old works made it possible to use certain services to cover both works, particularly such items as administrative offices, works canteen, main storage for tar and liquor, liquor concentration and dephenolation plants, and water gas plant. The old works, built in 1829, now has a capacity of 5.5 mill. cu.ft. of coal gas and up to 6 mill. cu.ft. of carburetted water gas per day, with an annual make of approximately 2,000 mill. cu.ft. The new works will produce an additional 3,400 mill. cu.ft. per annum, with a maximum daily capacity of about 11 mill. cu.ft. of mixed gas.

The Swan Village works has for many years formed an integral part of the gas supply to the City of Birmingham and the towns of Wednesbury and Darlaston, but, latterly, connections have been made with the gas supply systems of several adjoining towns in the Black Country. The preliminary scheme for building a new works at Swan Village was prepared under the direction of Mr. G. C. Pearson, O.B.E., Chief Engineer, and approved by the Gas Committee of the Birmingham City Council before nationalisation, but it is now the intention of the West Midlands Gas Board to use the new works for feeding a much more widely integrated network of gas supply.

Owing to increasing difficulty in obtaining suitable sites for new gasworks, it was imperative that this relatively small site at Swan Village should be developed to produce the maximum possible quantity of base-load gas. With modern dwelling-houses in very close proximity, the Borough Council of West Bromwich, within whose boundaries the works are situated, was promised that all works buildings should be of pleasing design, and that local amenities should not be impaired.

It has been possible, within the limitations and physical restrictions of the site, to install coal gas plant of 8.5 mill. cu.ft. per day capacity, and, by installing a new 3 mill. cu.ft. per day water gas machine in an extension to the water gas house at the old works, to provide for a total production of 11 to 11.5 mill. cu.ft. per day. The water gas from the new machine is piped in the crude state to the new works, where it is metered and purified with coal gas. It was essential, owing to lack of other suitable sites, to construct a new 5 mill. cu.ft. gasholder on the new works, thus providing storage for 11 hour maximum make of gas from the new works.

The merits and demerits of mechanical producers have been frequently argued. The points against them are: high capital cost, some loss of sensible heat in the producer gas, and inability satisfactorily to gasify run of retort coke. with a wide range of grading. The points in their favour, however, are: elimination of the arduous manual labour of fire cleaning, ease of control of quantity and quality of producer gas, and, above all, ability to gasify the smaller graded sizes of coke that cannot be used satisfactorily on step grate producers.

Mechanical Producers at Swan Village

The mechanical producers at Swan Village have been rated to gasify 18 tons of No. 4 coke (¼ in. to ¾ in.) per producer per day. There is frequently a surplus of this grade over market requirements, and revenue is lost if it has to be sold at a lower price either alone or mixed with 0 to ¼ in. breeze to constitute 'rough breeze.'

The ability to gasify 22,000 tons per annum of No. 4 coke on the producers gives greater flexibility and balance to the coke market by releasing the more popular grades for sale. Incidentally, the new mechanical producers absorb more No. 4 coke than is made at the new works; the balance will be derived from the old Swan Village works or from other Birmingham works, according to circumstances.

Wherever mechanical producers are installed, it is essential to include one spare producer to allow for overhauls in rotation. At Swan Village, four 8 ft. dia. producers are required to heat the settings when gasifying No. 4 coke; accordingly, five producers have been installed to provide a standby. The grate area provided calls for a maximum gasification rate of 33 lb. of No. 4 coke per sq. ft. per hour, which is a figure readily attained. It is possible, however, to heat the settings adequately with three producers by using No. 3 coke (¼ in. to 1¼ in.) and increasing the gasification rate to 44 lb. per sq. ft. per hour, thus assuring continuity of gas production in the event of a breakdown, even if one producer is already off for overhaul.

With this flexibility, a further advantage accrues in that extra producer gas can be made available for dilution during periods of exceptional peak gas demand (*i.e.*, those occasional peaks of demand that are beyond the capacity of the carburetted water gas plants that cover the normal margin over base-load requirements). Provision has been made to admit up to 1.3 mill. cu.ft. per day of producer gas into the retort house foul mains. This quantity of gas involves the gasification of an extra 10 tons of coke per day, and this can be achieved either by using all five producers on No. 4 coke with a gasification rate of 30 lb. per sq. ft. per hour, or, by using No. 3 coke on four producers, at a gasification rate of 38 lb. per sq. ft. per hour. The additional producer gas passes through a simple washer and then through an orifice meter before entering the foul mains.

The lowering of calorific value resulting from this practice is corrected by carburetting the water gas to 450 B.Th.U. per cu.ft. instead of producing blue gas at 295 B.Th.U.; the effect is virtually to use carburetted producer gas to increase the output of the works by 14% above the normal maximum, to meet exceptional peak demands. This extra gas is available at any time and with no additional

labour requirements, and for virtually no extra capital. Why, then, is this readily available overload not used continuously to reduce the call on normal peak-load carburetted water gas? The answer is that it does not pay when carburetted water gas is available, because carburetted producer gas costs 11d. per therm (materials only), compared with 9.1d. per therm for carburetted water gas (labour and materials). Nevertheless, it is very much cheaper to obtain additional extra peak gas in this way than to lay down separate plant of any type for very occasional use. Any separate plant requiring capital expenditure, working at very low load factor, and calling on additional skilled labour in emergency, produces very expensive gas.

It may be pointed out that in Birmingham the daily productive capacities of coal gas and carburetted water gas plants are in the proportion 3:1 with annual load factors of 83% and 50%, respectively. At 50% load factor, the cost of producing carburetted water gas, including capital, is certainly lower than carburetted producer gas involving no capital charges.

The weighing of fuel to producers is of great importance in assessing the performance of carbonising plants. For Swan Village, second-hand railway wagons have been purchased, and their sides heightened to deal solely with fuel to the retort house. The wagons are filled from the screening plant storage bunkers, weighed on the works weighbridge, and the fuel is elevated to the retort house, using the normal coal-handling plant with suitable band conveyors to the producer fuel hoppers.

DISCUSSION

Mr. T. C. Finlayson (Woodall-Duckham Company) said he had had the privilege of visiting Swan Village and despite the high gas output on a relatively small site there was a feeling of spaciousness with plenty of room to perform all essential duties. By taking advantage of all modern technical advances and developments in gas manufacturing, purification, and other ancillary plant, it had been possible to build a base load works of 11-11½ mill. cu.ft. of gas per day on little more than 11 acres, which was a very economical use of ground space.

On a paper which was largely factual it was difficult to make useful comments, because over the next few years the author would produce the answers to the queries they might raise in the day-by-day operating results of the works. One very interesting feature at Swan Village was the generation of steam in waste heat boilers of the fire-tube type at the high pressure of 350 lb. per sq. in. and a temperature of 650°F. This was an interesting development, not only on account of the considerable percentage increase in power generation, but because it allowed the producer fuel to be used very efficiently in performing three important and separate jobs—first, heating the continuous vertical retort plant; secondly, providing considerable electrical energy; and, thirdly, supplying process steam for the whole of the works in the form of exhaust steam from the turbo-generators.

The operation of waste heat boilers at these high pressures necessitated a very high standard quality of feed water. Only relatively small boilers could be used and in order to reduce waste gas temperatures to a normal figure it was necessary to install economisers with consequent increase in capital expenditure. The gas industry would await with considerable interest the economic outcome of this most commendable development in overall fuel economy.

Attention should be drawn to the flexibility of the mechanical producer plant in that various grades of fuel could be used, thus varying the quality of and grade of coke for sale to suit prevailing conditions, and, possibly even more important, the producers could supply 1.3 mill. cu.ft. of diluent producer gas per day at periods of extreme peak load.

In 1950 he had the privilege of contributing to the author's paper which subsequently gained the Institution Silver Medal. In that paper the author discussed the best methods of using existing gas-making plant and planning of extensions with maximum economy. At that time Mr. Hawthorn shook many of them badly by suggesting that, when considering extensions to gas-making plant, carburetted water gas plant was generally to be preferred to coal gas plant if the existing proportion of carburetted water gas was materially less than 33% of the total gas-making capacity of the works. He was glad to find that, three years later, the author had somewhat modified his views and that for Swan Village he regarded the using of up to 27% of carburetted water gas as being only the second best method.

G. J. 5066

The subject of costs of gas production was a very complex problem and, in his view, completely defied generalisation and needed detailed consideration for each particular case, and even then only held good for coal and coke prices prevailing at that time.

The author had come to the conclusion that under present conditions of coal/coke price ratio the most economical method of running his new base load works at Swan Village was to make 85% of a high calorific value gas in the continuous vertical retorts and dilute it with 15% of externally made blue water gas.

In other words, so long as coke could be sold, coal carbonisation was a cheaper means of making enrichers than oil cracking—even though the blue water gas was made externally. In view of the author's progress of thought he trusted it might not sound churlish when he said that even now the case for the external production of blue water gas was slightly overstressed and that the author's figures, purely from the point of view of gas manufacturing costs, were a trifle biased against the production of 450 B.Th.U. gas by steaming in continuous vertical retorts.

Some gas engineers would consider that when carbonising mainly Notts. and Derby coals in continuous vertical retorts they would not expect to make 11.5% more therms per retort per day at 500 B.Th.U. than at 450 B.Th.U. It was upon the assessment of the correct figure for this claimed increase in therms per retort per day by making high calorific value gas that the economies following the external production of blue water gas arose. He hoped that in, say, another three years the author would let them have a third paper telling them whether his figures worked out according to his calculations.

What was important at Swan Village was that the works had not been designed to suit prevailing conditions, but had been designed with the highest possible degree of flexibility to meet changing conditions in the price of coal and coke and the demand for gas and coke.

The works had also been designed to take into account changes in coal quality

G. J. 5060

W. White, Saffron Walden. E. H. Winch, Cambridge; S. K. Hawthorn, Birmingham; F. J. Bengough, Birmingham; J. M. C. T. Mulholland, Selby.

and it would be observed from the paper that to meet peak loads with lean coals where a C.V. of 500 B.Th.U. was not possible, it was possible to carburet to 450 B.Th.U. and use up to 27% of carburetted water gas in the mixture at less than 0.7d. per therm higher than with the fatter coals and blue water gas diluent.

The keynote of the new works could be summed up in a single word—flexibility; flexibility as regards total gas and coke output, flexibility as regards costs of gas production in that changes of gas manufacture could easily be made to suit any changes in coal and coke prices, and flexibility as regards changes in coal quality.

Dr. **J. Burns** (North Thames Gas Board) commented that Mr. Hawthorn complained to some extent that the site was very restricted, but he thought now that fashions were changing and there was a better appreciation of the value of design to put the maximum amount of plant efficiently on to the smallest area possible.

The advantages were fairly obvious, for such a design entailed the minimum conveyance of materials whether by pipe, main, rubber belt, or rail truck. In our newer layouts of plant they were tending to the use of the multi-storey system, putting, for instance, water tube condensers on to the first floor, with pumps, switchgear, etc., on the ground floor. The very large plant on the restricted site, too, entailed the minimum amount of operational costs for cleaning and road-rail upkeep, etc., and the general compactness of design led to tidiness and cleanliness on the works, which was always helpful to efficiency.

In his own Board they had a high variation in output per acre. The maximum output per acre was at Brentford, where it was exactly 2 mill. cu.ft. per acre, and they went down to very much less than half-a-million cu.ft. per acre at some of their bigger works. Even if a very large site was available, it was preferable to plan the units in small compact sizes to allow of the maximum use of the ground available to their successors.

If they were given a completely free choice, probably they would choose a rectangular site with one side of the rectangle parallel to the coal receiving depôt, whether it was rail or sea, and then he thought it was fundamental that they should have the minimum carriage of their main raw material—coal—which meant that the coal stocking ground should be adjacent to the point of coal intake. There was perhaps a little room for criticism of the layout of the Swan Village works in this respect.

The handling of coal on the works constituted probably the major handling cost, and he thought it was extremely important that they should get this right. There was room for criticism of the transporter grab system installed at Swan Village. Surely on a site of this restricted size full use should be made of conveyors. It did not seem quite appropriate that coal ex stock should be loaded into railway wagons and the railway wagons trundled along the works, and he would say that there would be advantages in the overhead conveyor stocking system, with distribution by means of bulldozers, coupled with the underground conveyor tunnel system of recovery. The use of bulldozers for stocking and reclaiming coal killed two birds with one stone. First, it distributed the coal on the coal stocking ground. Secondly—and this was important—it consolidated the coal in stock and, as they had found from experience, to a tremendous extent prevented the incidence of spontaneous combustion in coal. They were rapidly installing this system into practically every works in the North Thames Gas Board and they were saving many thousand tons of coal which previously were lost by spontaneous combustion.

The provision of the concrete pit which the author provided for the coal stocking ground was admirable as that in itself was conducive to the prevention of fires. It provided some means of preventing any ingress of air, which might cause spontaneous combustion in coal.

He wished to say a few words about the provision of plant for seasonal and peak load purposes. The author had followed the system of providing for them by means of the overload capacity on the base load units. This was all right where the seasonal load and the peak load were of a relatively small amount, but obviously the amount of seasonal load and peak load which could be covered by the overload capacity in the base load plant was relatively small, and there was always the danger of spending too much on the capital cost of the base load plant when striving to kill two birds with one stone. The seasonal load characteristics in the North Thames area were such that it would be wrong to provide for the seasonal load and peak load demand on the overload capacity of the base load units.

In connection with capital charges, what was covered by the 1½d. per therm capital charges? At what load factor were these capital charges calculated?

He thought the steam and power system installed at Swan Village would not be entirely suitable for a completely independent works, admirable though it was. They were fortunate in having the old works to act as a reservoir for excess power produced in the new works and as a giver of steam when required, but, although the system was admirable for

G. J. 5051

D. G. Elgin, Scottish Gas Board; K. J. Munslow, Robert Cort & Son, Ltd.

that setup, they must be careful about using it where they had completely isolated works.

Mr. **H. S. Cheetham** (Humphreys and Glasgow, Ltd.) remarked that the site at Swan Village presented many difficulties to be overcome, and he suggested that the result in terms of manufacturing capacity was not unrelated to the proverbial quart in a pint pot. There was, however, no suspicion of a cramped layout. The buildings, in particular the retort house, were very attractive, especially from an architectural point of view.

The permutations and combinations which, as described by the author, were available by the strategic use of coal gas plant combined with carburetted and blue water gas plant and mechanical producers were certainly outstanding.

The arrangement of the water gas plant whereby there were two separate gas streams, each with its own relief holder, etc., one supplying the new works with blue water gas for dilution and the other with carburetted water gas or blue water gas as desired for use on the old works, was, he believed, unique. It had considerable advantages, including economy in capital expenditure.

In regard to the mechanical producers, he was entirely in agreement with Mr. Hawthorn's statement that there was some loss of sensible heat as compared with built-in producers. This heat loss was, however, minimised by ample insulation and was less than the heat lost as unburned carbon in the ashes from step-grate producers.

Mr. Hawthorn had referred to the advantages of ease of control of quality and quantity of producer gas, but he thought that a point of equal importance was the uniformity of both quality and quantity obtainable with mechanical producers.

When he first read this interesting paper he was reminded that when continuous vertical retorts became an accepted form of carbonising plant, it was predicted by some that separate water gas plants would no longer be required, and that substantial economies would be effected by the production of water gas *in situ* in the retorts. Not long after it was found that more carburetted water gas plants were being installed with continuous vertical retorts than with any other form of carbonising plant. This was due, of course, to the lesser flexibility of continuous vertical retorts as compared with horizontals. Now the author of this paper advocated the provision of carburetted water gas plant not only to provide for the peak load, but as a means of minimising capital charges and reducing the manufacturing cost of base load gas. In the case of the plant described in the paper, the saving in capital charges alone calculated to some £16,000 per annum on the author's figures.

G. J. 5022

R. O. Roberts, Connah's Quay; H. B. Kendrick, Conway; J. Foster, Atherton; J. S. Marshall, Lincoln; E. B. Field, Sheffield.

The author referred to no fewer than six gases which, in the circumstances given, went to make up town gas—to wit, straight coal gas; steamed coal gas; carburetted water gas; blue water gas; producer gas; and, a relative newcomer, carburetted producer gas.

Mr. Cheetham predicted that in the not very distant future there would be another gas in the *mèlange*—oil gas.

Ever since carburetted water gas was introduced into this country, one had heard objections on the grounds that it was not in the best interests of the gas industry to use imported oil as well as their own indigenous fuel in gas manufacture. Now, for better or worse, they had their own huge oil refineries which produced large quantities of what was generally known as 'heavy oil.' In Abadan, the surplus of this 'heavy oil' was put back into the ground, but they could not put their surplus into English soil. They must use it; and he suggested that in the development of processes to use 'heavy oil' there was available the best and most economical means of meeting the shortage of carbonising coal.

New processes were actively being developed today for both thermal and catalytic cracking of heavy oil, which would, he believed, effect useful economies in the cost of gas production and which would not have some of the disadvantages which were noted in the Productivity Team Report on Gas Production in the U.S.A. Plants were in routine operation, and in the case of catalytic plant which produced a gas completely interchangeable with normal town gas, one installation had provided the whole of the town supply since the beginning of the year. In connection with the development work in this country in the use of oil-gas processes he would like to take the opportunity of paying tribute to the Chairman and members of the West Midlands Gas Board for their willingness to collaborate with his own Company in valuable pioneer work.

G. J. 5027

R. W. Lush, W. J. Jenkins & Co., Ltd.; D. G. Harris, Weston-super-Mare; T. A. Nicholson, Weston-super-Mare.

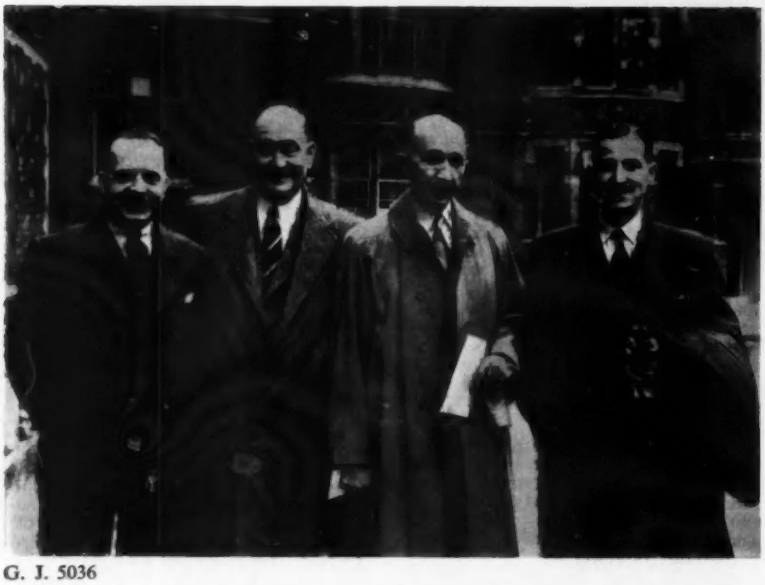
Mr. **K. W. Francombe** (Whessoe, Ltd.) remarked that one of the most important matters dealt with in the paper was the flexibility of the gas and coke production plant. Mr. Hawthorn had stated that coke production could be reduced by 38% without loss of total gas output. As long as the gas industry remained a two-fuel industry, surely this combination of orthodox gas-making units which would secure this variation in coke output must constitute some threat to the success of complete gasification proposals now under consideration by the industry.

The Swan Village plant seemed to constitute a happy combination of the inherent flexibility of continuous vertical retorts—with or without steaming, heavy or light steaming, variations in coal and

so on—and of carburetted water gas and blue water gas, together with producer gas dilution when required for exceptional peak gas loads. It was also interesting to see that it was claimed that this combination would produce the cheapest possible gas when operated normally.

He would turn to the design of the gas cooling and scrubbing plant. He was wholly in agreement with the system employed, but this was not surprising, since he was fortunate enough to collaborate in a small way with Mr. Hawthorn in its design. There was no nonsense about including Livesey washers in this contract. Indeed, he was surprised that Mr. G. U. Hopton had given them so much house-room in his recently published treatise on cooling, scrubbing, and purification of gas. It was significant that Mr. Hopton did not to a figure at which they would not condense in the coldest part of the tower purifiers. He preferred this description of their function to Mr. Hawthorn's 'removing any remaining traces of tar-fog.' He believed it was Mr. F. H. Bate who was carrying out tests at Birmingham on this system long before nationalisation. He described at one of the conferences the work he was doing in giving vertical retort gases this final oil scrub. Since then both Dr. Dent and Dr. Moignard had emphasised the importance of this final oil scrub in their most valuable publications on oxide purification.

It would be of great interest to await the results from this system at Swan Village and particularly to know whether a feed of 40 gal. per mill. cu. ft. in a four-stage scrubber would be sufficient to prevent condensation of light



G. J. 5036

J. Fletcher, Preston; C. H. Davidson, R. & J. Dempster, Ltd.; S. L. Filer, Tredegar; A. P. Jennings, Plymouth.

employ them himself, at any rate in many of the newer gas-making plants in the North Thames area. However efficient, they could provide only single-stage ammonia scrubbing, and however efficient that single stage might be, they had to contrast it with a theoretical minimum of at least five stages and a practical requirement of from six to 12 stages, for the efficient removal of ammonia from gas. As tar extractors, Mr. Francombe doubted whether they had ever removed more than 60 or 70% of tar fog, so that they were a poor standby to electro-detarrers.

To revert to the Swan Village system, they saw that there were 12-stage ammonia scrubbers, and tar and oil fog was successively extracted in hot-gas electro-detarrers, turbo-exhausters, and cold-gas electro-detarrers, and the gas was given a final oil scrub before passing to the tower purifiers. If tar and oil did get into the oxide after all this treatment, then Mr. Avery ought to abandon hope of tar-free oxide!

The most interesting item was the final four-stage oil scrubber, which it was hoped would reduce the saturation temperature of the light hydrocarbons oils and gum polymers in the purifiers.

Mr. **S. L. Wright** (Wales Gas Board) said that the paper was a useful textbook on the application of modern practices to processes of gas manufacture. Advantage had been taken of the ability to operate a continuous vertical retort house as base load plant to produce an economical mixture of straight coal gas and blue water gas which was also especially acceptable for distribution by reason of its low specific gravity and good combustion characteristics.

Reference had been made in the paper to the daily production capacities of coal gas and carburetted water gas plants supplying Birmingham as being in the ratio of three to one. It would appear that without the stabilising influence of carburetted water gas production at other stations in Birmingham, the contemplated change in gas mixture from 84% straight coal gas plus 16% blue water gas to 74% straight coal gas plus 26% carburetted water gas would cause difficulties in utilisation on the district.

The simplification of exhauster inlet vacuum control would appear to be one of those things which needed to be seen to be fully appreciated. Manual control was not usually satisfactory when dealing with varying gas rates, and it would be interesting to known to what extent the satisfactory results obtained could be attributed to a steady rate of gas output from the generating plant.

Mr. **R. L. Greaves** (North Western Gas Board) remarked that Mr. Finlayson had suggested that the comparison between 500 and 450 B.Th.U. might be rather optimistic. That point had occurred to him (the speaker). In the paper it was stated that the volumetric production per day was nearly the same at calorific values of 500 or 450 B.Th.U. This was contrary to the established and generally accepted fact that the thermal production remained approximately constant over this range, and consequently the volumetric product was higher at 450 than 500 B.Th.U.

This statement materially affected the figures given in the paper. Moreover, the two sets of figures at 500 and 450 were not comparable since they were based on equal volumes of gas and not on equal numbers of therms. He suggested that a correct comparison should be based on equal thermal production, and this would again influence the estimated costs per therm.

There appeared to be some discrepancy in the figure given for net cost of coal at 500 B.Th.U. He started working out some figures to see whether the old adage was wrong, and there were some slight errors which ought to be noted. The figure for the net cost of coal should be 4.26d. He calculated the throughput at 1.13, coke made for sale 256 instead of 250, and therms per ton 14,262 instead of 14,328. Taking an equal thermal output at both 500 and 450 B.Th.U. and adjusting the figures accordingly, including the higher yield of tar which would result at 450, it would be found that the direct cost of coal gas at 500 and 450 B.Th.U. was 7.965d. and 7.856d. respectively.

While in the paper a case was made for the flexibility of the combined processes, he suggested that, in view of the fact that the installation in question was to furnish base load, a sufficient degree of flexibility could be obtained with continuous vertical retorts alone. While flexibility was very desirable, it was obviously obtainable only at a cost which should be carefully examined.

Assuming Mr. Hawthorn's basic data to be correct, there would appear to be a lack of flexibility if it was necessary to reduce the throughput to the extent indicated to obtain a 450 B.Th.U. gas. Mr. Greaves suggested that the heat input given in the paper as constant should be capable of producing the necessary amount of water gas and at the same time maintaining a throughout sufficient to give a constant thermal output.

Mr. **W. R. Garrett** (Northern Gas Board) said he marvelled how Mr. Hawthorn had managed to produce such a wealth of information on the new works in view of the fact that gas-making did not begin until April, 1953. With the emphasis more than ever on capital costs and with the similarity of output that existed between the new works described and the new Howdon works of the Northern Gas Board, it might be of interest to state that, against the author's total cost of *about* £2,185,000, the *actual* Howdon figure was £1,866,063, which, of course, covered the rise and fall clause.

The Howdon plant was capable of producing 8 mill. cu. ft. of coal gas at 475 B.Th.U. and 4.8 mill. cu. ft. of carburetted water gas at 500 B.Th.U. when using 2 gal. of gas oil per 1,000 cu. ft. The carburetted water gas stream, complete with buildings and foundations, condenser, exhauster, detarrer, purifiers and meter—*i.e.*, everything except relief holder—cost £200,569. Some of the £319,000 difference between the cost of the two plants could no doubt be attributed to the shorter period in which the rise and fall clause operated. The Howdon installation was completed in less than three years from the time of notifying the carbonising contractor that he would get the job. In this respect he would advocate (providing the contractor had not an excessive number of orders on his books) that the foundation work should be carried out on an agreed schedule. He would suggest also that it was about time they considered giving orders to contractors on a fixed price basis.

One of the chief advantages claimed for vertical retorts was the small ground space required. While he agreed with the author that at the new Swan Village works this was relatively small, being 11 acres for 8.5 mill. cu.ft. per day, he would remind him that the Rotherhithe works of the South Eastern Gas Board produced 9.6 mill. cu.ft. per day in horizontal retorts with an area which, he believed, was 6½ acres.

On the question of actual production costs from the Howdon works, the cost into holder for coal gas from October 1 to December 27, 1952, was 4.531d. per therm, which included the capital cost of 1.89d. per therm.

They knew what was implied by the author's statement: 'The location of the site near dwelling-houses dictated the choice of continuous vertical retorts as the carbonising plant.' His own contention was that they must build the plant which would give the public the cheapest therm of gas; their whole future depended on that. If the site was not suitable for a certain type of plant because of certain factors, he submitted that both themselves and the contractors must meet the challenge. In particular, he would draw attention to the abnormal amount of time occupied on some intermittent vertical chamber plants between the opening of the breeze doors to charging of the retorts and the replacing of the retort lids.

In view of the amount of trouble that he had both seen and experienced, he was doubtful whether it was wise to install economisers to reduce the waste-gas temperatures to near dew-point before release to the stacks. In the Howdon works the boiler pressure was 300 lb. per sq. in. with no economisers.

G. J. 5046

D. Muir, G. Orme & Co.; D. Phillips, Aberdare; D. S. Davies, Abertillery.

He could not understand why the author decided to have three feed pumps, each sufficient to supply all the four waste-heat boilers. It seemed an unnecessary and very extravagant arrangement. He also could not understand why the author had installed one steam-driven boiler pump and yet had driven his exhausters by electric motors. Surely it was more important produce gas than to produce steam. After all, it was stressed in the paper that four independent sources of electricity supply were available and that the power supply was 'virtually impregnable against breakdown.'

Was the author quite correct in comparing the cost of the squirrel-cage motors at £690 each with the £2,500 for the variable-speed machines? Surely the cost of scoop control and the loss in efficiency entered the picture.

On the question of three exhausters each capable of taking the full gas make, it would appear that the author had been over-cautious. He himself would rather install Arca type regulators in place of the bell-type governors than spend money on spare machines. The bell-type governor was sluggish in operation, and the Arca regulator might even be justified on the increased thermal yield.

In the North they had installed an oil-washing plant prior to purifiers, and, in spite of the long distance between the washer and the purifiers, they had had some difficulty with oil carry-over. He hoped that this would not present a problem at the new Swan Village works, especially in view of the rate of variation of gas yield from 8.5 to 13.5 mill. cu.ft. per day caused by the carburetted water gas plant.

They were at least at one on the question of providing good staircases and platforms for the operation of valves, but even these most desirable features pushed up the repair and maintenance figure and increased the capital cost; and they must ask themselves whether highly desirable items but not essential items for the safe operation of plant were justified, when they were looking at the price per therm.

His own view on the dry-cleaning of coke would be to spend the money on crushing the coal. The removal of ash from an ordinary domestic hot-water boiler was an easy matter, but, when one entered the bathroom and found the hot water cold and the boiler full of shale, and thought of the price that one was paying, it was hardly conducive to starting the day in the right frame of mind.

From the paper he gathered that only No. 3 and No. 4 size coke were dry-cleaned, and, further, that there was insufficient No. 4 size coke to supply the new works. Surely it was unnecessary to clean the No. 4 size coke when it was used in mechanical producers.

G. J. 5034

T. W. Austen, Woodall-Duckham Co.; T. C. Finlayson, Woodall-Duckham Co.; W. T. Newton, West Midlands Gas Board.

Mr. S. K. Hawthorn, in a brief reply, said he would like to refer to one point which several speakers had mentioned—namely, the thermal output of retorts at a high calorific value and a low calorific value, and the question whether a substantially higher thermal output could be obtained at 500 B.Th.U. per cu.ft. than at 450 B.Th.U. He maintained most firmly that that could be done, in view of the fact that the amount of heat required to carbonise coal was very much less than that required to convert coke into water gas, and, when in a retort they were putting heat into the combustion chamber at a maximum rate. If they used that heat to produce coal gas they would produce more therms of coal gas than they would if they used part of the heat to make water gas. That was the whole essence of the argument about the thermal output at high and low calorific values.

Abstract of I.G.E. Communication No. 425

H. JOHNSTON O.B.E., Chief Engineer, North Eastern Gas Board

EXTERNAL INFLUENCES ON THE FUTURE OF GAS

AT the present time, 12.4% of gas made available is purchased from coke ovens owned by the National Coal Board, the steel industry, and a few independently owned plants. The total quantity of gas purchased from coke ovens has risen from 257 mill. therms in 1945 to 330 mill. therms in 1951.

Future increases in coke oven gas availability is largely a question of (i) future demands for hard coke for blast furnace and foundry purposes, and (ii) the extent to which existing old ovens are replaced by new ones. The future trend of hard coke requirements for industry is problematical. The nation's requirements for steel and iron have been greater than supply. It seems reasonable to expect expansion while industrial productivity remains at its present level.

The Potential Demand

Changes in the national and international position could rapidly upset any assessment, and the future in this respect is difficult to predict. Having regard to the physical capacity of the nation to produce and consume, and the economies in the use of steel that can be brought about by general adoption of new ideas of design and the use of alternative material, the broad view beyond the immediate future is that the potential demand is not likely to expand at the same rate as in the past.

While it may be doubtful that availability of coke oven gas will increase to any great influential extent by reason of necessity to increase production of hard coke, it does seem certain that substantial quantities of gas will be made available as the coke oven industry proceeds with plans for modernising or replacing the many old and inefficient plants with new plants.

The National Coal Board in its 1951 Report stated that new coking plants will be able to supply about 20% more disposable gas than the existing plants, presumably on the basis of rich gas firing and higher efficiency. All new batteries will be of compound ovens, which can be heated by coke oven gas or producer gas at will. When the ovens are fired by producer gas there will be twice as much gas available for sale as when they are fired by coke oven gas, and it will be possible to vary output within these wide limits. It appears, therefore, that the present availability of 330 mill. therms of gas per annum will be very substantially increased over the next 10 to 15 years.

The Gas Act, 1948, confers on the owners of coke oven plants the privilege of calling upon area gas boards to purchase all or any part of gas made available, if it is reasonably practicable and economical for the boards to do so. The Act confers upon area boards a monopoly in the supply of gas, but it also imposes a duty to develop and maintain an efficient and economical system of gas supply to satisfy reasonable demands.

The condition of practicability and economy of purchasing increased supplies from coke ovens will no doubt be considered when the obligation imposed on the carbonising industries to consult with each other, in planning and carrying out any programme of capital development and reorganisation of their activities relating to carbonisation, is fulfilled. The necessity of modernising or replacing old and inefficient coking plants with new efficient plants is readily understood. It is also appreciated that it is desirable, when replacing, to have regard to economic size with lower costs, and also that rebuilding may require new sites and locations. It has been stated that the basis of new coke oven installations is generally not less than 1,000 to 1,500 tons of coal per day.

As coke oven owners' plans for modernising plant are put forward, it is highly probable that gas boards now purchasing gas will be required to consider accepting increased quantities. It is also possible that the request may extend to other gas boards, if it is thought that the distance between points of supply and requirements are within economical pipe-line distance. Gas boards may be faced with complex problems of determining an economic price to be paid for new supplies of coke oven gas and conditions governing its purchase. The Gas Council reports that it is devoting attention to the effective co-ordination of the activities of gas boards and other bodies engaged in carbonisation.

The Question of Co-operation

Until recent years, any co-operation between the coking industry and the gas industry arose only from force of circumstances. The Gas Act, 1948, now imposes obligations to co-ordinate policy. Surplus gas from coke ovens will continue to be taken by the gas industry. Coke oven owners' plans for constructions and extensions will centre on requirements for industry of hard coke, and the need for replacing old inefficient plant with modern plant of large unit size. Gas boards will likewise plan to reconstruct and extend gas-making plant on modern lines to meet statutory requirements and fully to satisfy demands for gas as economically as possible. If the coke oven owners' plans to meet future hard coke requirements carry also increased quantities of surplus gas, then the gas board or boards in the area must consider taking this additional gas as an alternative partly or wholly to their own planned extensions. The gas board, then, produces two schemes of development to meet obligations of gas supply, the one a co-ordinated coke oven gas scheme, the other an independent gasworks scheme.

Assuming the coke oven gas scheme is sufficiently practicable to warrant considerations of economy, a principle must be established to assess the price at which coke oven gas should be supplied to the gas board. What would be a fair basis of charge for such gas?:—

(1) At a profit to the coke ovens on a method of allocated costing?

or (2) At a cost to the gas board less, by a reasonable margin, than what the net cost would be of manufacturing gas of similar characteristics in new gasworks plant?

(*Continued on p. 677*)

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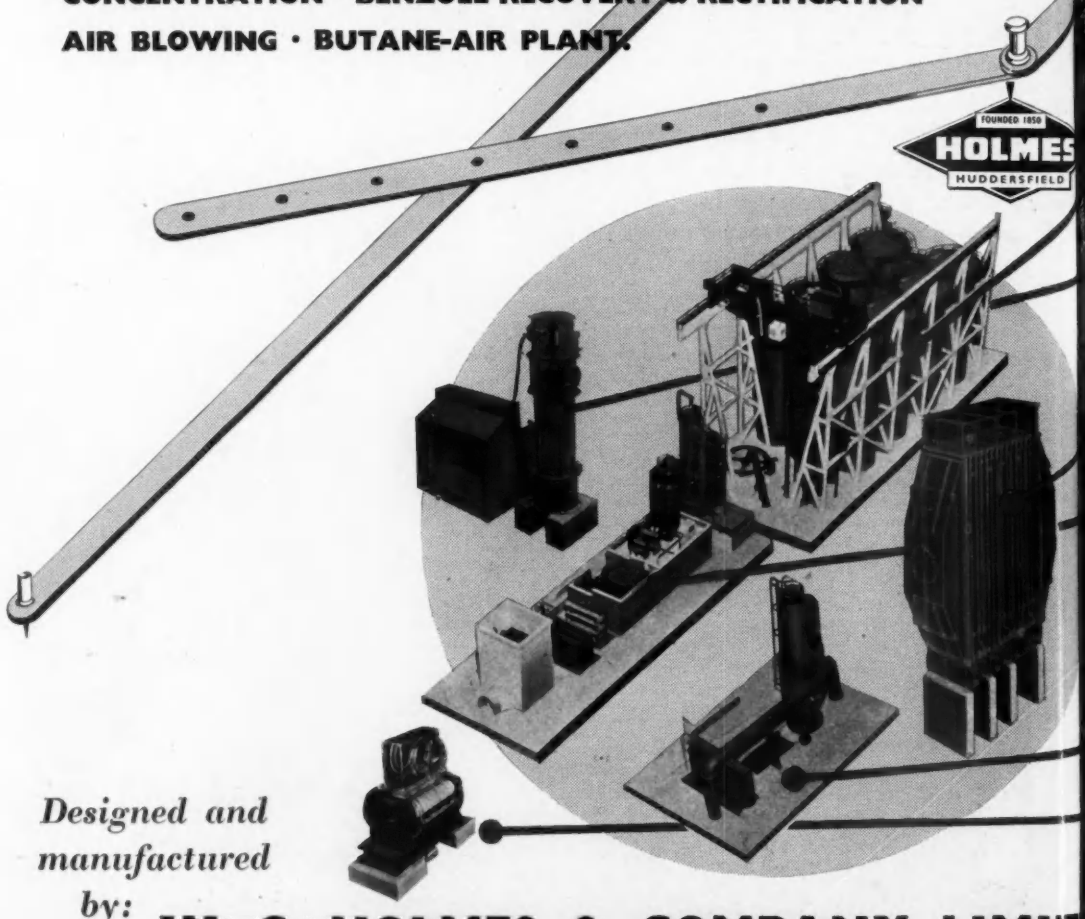

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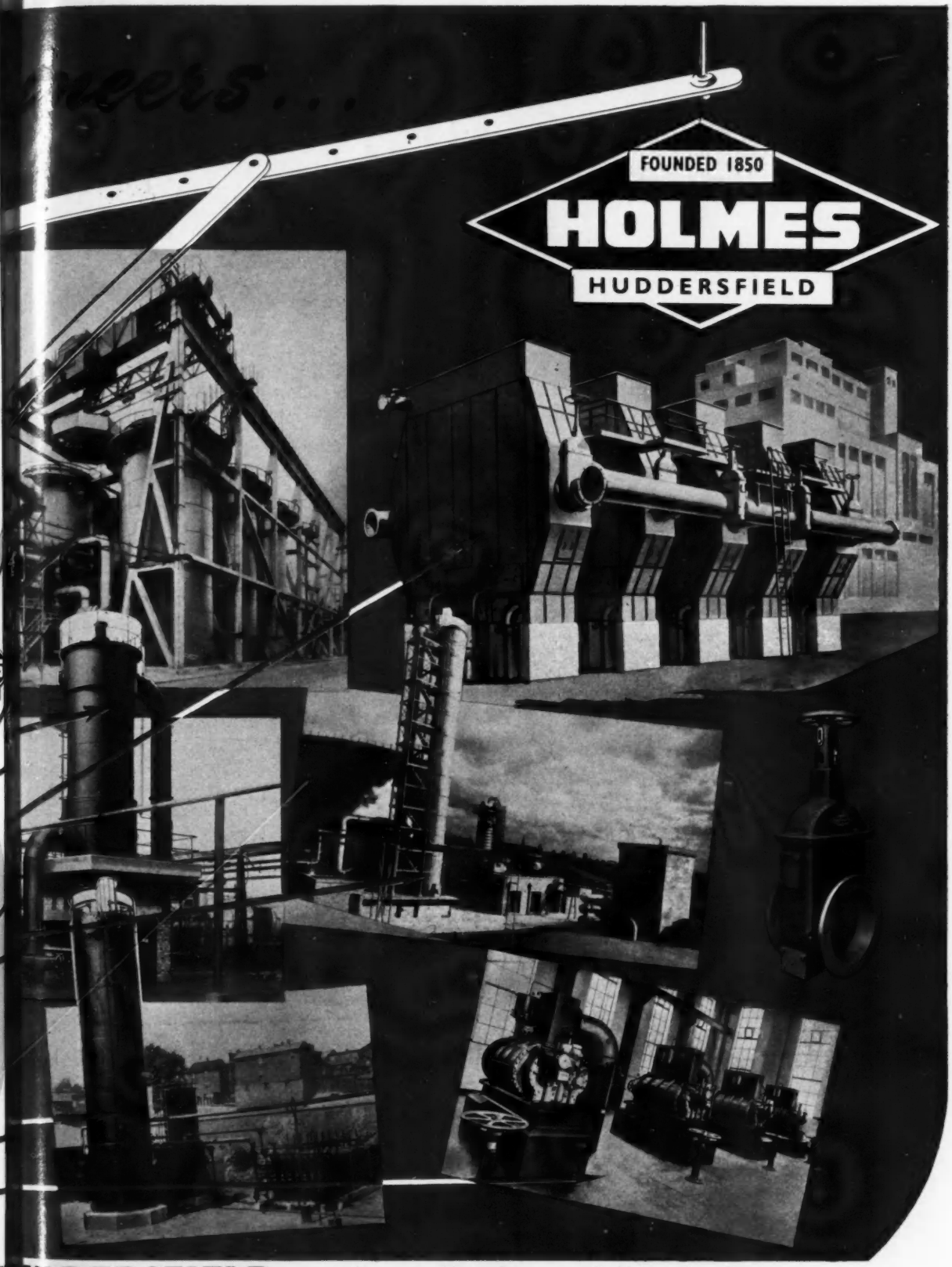

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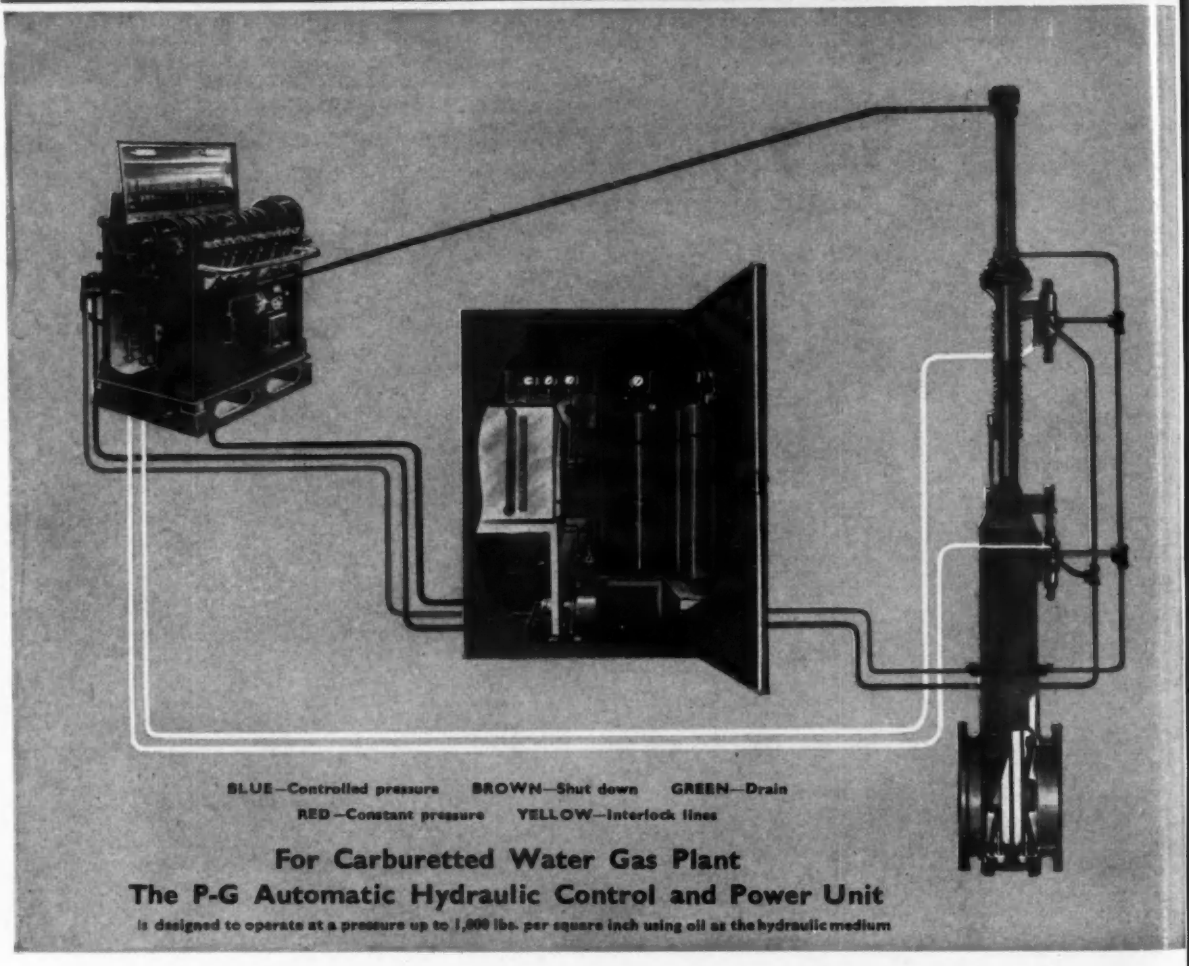

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or (3) At a cost to the gas board less, by a reasonable margin, than the net cost difference between
(*a*) comprehensive scheme incorporating gasworks plant, including production costs, and
(*b*) comprehensive scheme incorporating purchased coke oven gas to fulfil the same obligations over the same period of time as (*a*), but excluding cost of purchase.

The opinion put forward is that method (3) assesses most fairly the charge. Each case would be assessed on prevailing conditions. The price to be received by the vendors would be less only by a small margin than cost to purchasers, if they developed their own independent scheme.

The main function of a coke oven is to produce hard coke for industry, and it appears reasonable to expect that all works costs and charges be debited to the main product, coke, and income from residual products—including gas at a price the purchaser can afford to pay—be credited to off-set costs; that is, in a similar manner to methods that have to be adopted by gas boards in assessing the basis of charge to consumers of gas. In this case, gas coke is a residual product; the credit to be set against gas costs is limited by the amount sold and the price received.

Development Period

The common bases of schemes are the period over which development is to be considered and the requirements for gas within the period. The adopted period of development is largely dependent on circumstances. Having regard to the policy of erecting new coke ovens of economical minimum size, which could mean the ultimate daily release from one site of 20 to 30 mill. cu. ft. of gas with rich gas firing, and 30 to 45 mill. cu. ft. with producer gas firing, the period must be sufficiently long to embrace all consequences; this might well be as long as 15 years.

Assessments of gas requirements over the adopted period would have regard to forecasted gas demand within the geographical limits of the scheme, and to replacement of gas being produced from plant that must be scrapped either because of age and condition or for reasons of economy and to local circumstances and conditions. An opinion has been expressed that average demand for gas over the whole industry cannot normally be expected to attain an average expansion of more than 1.5% cumulative per annum. Conditions within the orbit of any scheme are peculiar to themselves and allowances are made accordingly; nevertheless, to avoid real dangers of over-capitalising, safe conservative estimates of demand are necessary.

A scheme of development incorporating purchased coke oven gas presents hazards of a more speculative nature than an independent scheme of gasworks development, for which allowances should be made. The overall basis of scope may be the same for both schemes, but unlike the gasworks scheme, which can be flexible and self-sufficient, the purchased gas scheme necessitates contracts with outside bodies and commitments to take agreed quantities of gas, possibly over years ahead, resulting in less flexibility. Any differences between forecasted and actual demands for gas would be buffered by gasworks plant, which could result in considerable idle capital and increased costs.

New coke oven units will, as a matter of economic policy, be built of a minimum size. As an approved co-ordinated scheme progresses, such units will no doubt be required, by the coke oven owners, for full production immediately on completion. To take in the full gas released as between one week and the next could possibly be an embarrassment to a gas board, in so far as it might mean closing down existing efficient base-load plant to accommodate the new supply until such times as the capacity is again required. With an independent gasworks scheme there is the opportunity of preserving a better balance of plant capacity with demand.

Increased transport and handling charges for quantities of gas coke might arise if coke were not available at districts by reason of carbonising at the pit-head. If coke oven gas is purchased, mains not otherwise necessary may be required, for example, from ovens to a point in the affected gas board's system. The reception of large volumes of coke oven gas at a point in an integrated gasworks system could involve mains and compression or recompression additional to requirements if gasworks plant were installed at strategic sites within the system.

Hard coke requirements are the basis of coke oven planning. Base-load coke requirements for blast furnaces and foundries, which consume about 75% of hard coke production, are satisfied by coke ovens owned by the iron and steel companies. Presumably, the burden of fluctuating demands falls mainly on National Coal Board ovens.

If a co-ordinated scheme of gas supply involving new ovens is negotiated, and after fruition the National Coal Board is required to face a surplus of hard coke, what will be the outcome? There will, of course, be flexibility in the ovens, if the contract involves disposal of gas, only to the extent of rich-gas firing. If, however, the contract provides for quantities to the full extent of producer gas firing, there will not be this flexibility. How, then, will the National Coal Board face such a position? The Board has the choice of either reducing coke production, in which case it cannot fulfil obligations to supply full quantities of gas, or finding fresh markets for the surplus coke. Outlets for surplus coke would be export and the home domestic market. Export is an unpredictable market. An extension of the home market would be in competition with gas coke. A gas board might find the position difficult any way. It would be possible to guard against this position by both parties agreeing on a sell—buy basis to the extent of rich-gas firing of the ovens only, and ensuring fulfilment of contract gas supplies at all times.

Whether or not there is justification in claims that negotiated prices for coke oven gas should take into account the necessity for providing stand-by plant at gasworks has often been debated. There is no doubt that area gas boards, obliged by Act of Parliament to make available and maintain supplies of gas to declared standards of calorific value, pressure, and purity, are onerously placed when they take substantial supplies of gas from a second party who has no such obligations, and they must take practical steps to ensure that they are at all times and under any conditions able to comply with statutory requirements.

Element of Competition

The future of gas is trammelled by the use of other fuels. Each has a wedge of the not unlimited total fuel requirements, and there is and will be considerable internal pressure within the whole, each endeavouring to deflect and depress the other. To better or even to maintain the present trend of gas sales, the real price must be bettered or at least maintained. This demands not only every effort in daily working with the tools at our disposal, but also recognition of the influence of changing conditions and that new tools and methods will be required.

Processes for the complete gasification of poor coking and high ash coals not suitable for carbonisation, but in more plentiful supply, now the subject of research, as outlined by Dent, would appear to be of vital importance. If investigations now being pursued could lead to a position whereby the major part of additional gas requirements could be satisfied economically by gasification and synthesis, beyond the next 10 years problems of supplies of suitable coals, balancing of coke production, siting of new large works, with attendant difficulties—not so necessary for gasification units as for carbonising plants—would to a large extent be negatived.

To improve the economic position, consideration may be given to larger production units and to the economic long-distance transmission of gas as against coal. Coke ovens will continue to be built to provide the nation's industrial, and possibly an increasing share of domestic, requirements of coke. They will also provide considerable additional quantities of gas, which will be taken by the gas industry.

The pattern of the future may be that both coke ovens, carbonising higher grade coals, and gasification plants, using low grade fuels, may be sited at pit-head, and that a portion of the 100% base-load gas may be transmitted over long distances and through a national network of mains to reception stations in each area. The remainder of the base-load together with peak-load gas must of necessity continue to be made with existing plant on the spot.

Gasification of lower grade coals could possibly lead to feeding electricity generating stations with gas instead of coal, as an all-round measure of economy. Any such development would require a higher order of co-ordination than there is at present.

Finally, in emphasis, the main object of the area gas boards is to provide potential heat in the form of gas at the lowest real cost. While they are, in the national interest, bound to take in and distribute gas available as a by-product from other industries, when it is economical to do so, they must manufacture from such coal as is available the bulk of the country's gas requirements. Carbonising plants will be retained and maintained. New carbonising plants will of necessity be installed, and for some time gas coke will continue to be produced in increasing quantities, but if the gas industry is to repeat phenomenal performances of the past in overcoming adversity, and maintain its rightful place as the nation's supplier of potential heat, it must give pride of place and effort in its development programme to an early practical solution of new techniques, of which gasification is the most promising. The sooner there is recognition of major external influences, the sooner mounting difficulties will be met, and gas achieve its rightful destiny.

DISCUSSION

Mr. T. C. Battersby (Eastern Gas Board) said that at the outset the author had focussed attention on the difficulties which were encountered in attempting to determine the future demand for gas. In the 30 years that he had chosen for his survey, from 1920, they started with the aftermath of the first world war, followed by a period of slump, then a second world war, subsequent years of increasing productivity and the extended use of gas in industry, and several years of solid-fuel rationing, and, in the background of the whole period, there had been a social evolution.

There was no evidence to suggest that the consumption of gas per domestic consumer was increasing, though he had no doubt that the overall domestic demand would expand as houses were built to accommodate the increased population. Their greatest potential load lay in the extended use of gas in industry, and for this they would look to their industrial gas engineers, who had already done so much in this direction.

With an Englishman's genius for compromise, the author had struck a middle course, and his third assumption was, said Mr. Battersby, as good as anyone's guess could be. What did emerge from this study was the importance of ensuring that their plans were sufficiently flexible to meet any eventuality.

The demand for gas by all classes of consumer would depend on the relative price of alternative fuels and, in the case of the domestic consumer, on his capacity to pay for the amenities which the fuel industries could offer. He could not see that anything less than a major change in technique could appreciably lower the cost of gas, and he thought the same was equally true for electricity. To-day the price of gas per effective therm was so close to the price of electricity, their main competitor in the domestic field, that even very small variations were critical.

They in the gas industry would accept the author's contention that the gas industry was one of the essential industries, but he feared that this view was not shared by all housing authorities. They found that some authorities were willing to pay up to £50 for an electric service and installation, but it not infrequently happened that in the search for economy they were prepared to eliminate the gas installation or expect it to be heavily subsidised.

In considering the question of other fuels, the author had almost discounted oil and propane, a new contestant for business. Loads were being lost to oil, as no doubt other speakers would be able to confirm, at a cost per therm which gas could not approach. This was indeed a very disturbing fact, unless they themselves could harness the use of oil in new plants. Unlike their products and other fuels derived from coal, oil was not subject to the same economic influences, and it would appear that the price charged for oil was not entirely determined by production and distribution costs but also depended on how much it would fetch in competition with other fuels. If the author was right in his contention that the price was likely to follow coal, it must be for this reason.

In regard to distribution capital expenditure, the author had quoted a figure of £44.5 per house, and their experience in the Watford Division confirmed this, but he could not understand why the author had taken a consumption of 200 therms per house per annum. It was their experience that only about 75% of new house occupiers became gas consumers. The national figure in 1951-52 of domestic consumption was 122 therms per annum; in the Eastern area it was 121 therms and in the North Eastern area in the region of 100 therms. It might be that the author was setting us a new minimum target.

In the section of the paper dealing with the influence of capital costs, he found himself in very close agreement with the aim to keep down capital expenditure at this stage of their development. Unless existing plant was obsolete, the advantages of centralising manufacture with new plant were outweighed by the heavy capital charges per therm and the cost of transporting coke. Their own experience was leading them to the conversion of medium-sized works to base-load stations interlinked with a large station which alone took the seasonal variations. In this way idle plant was kept at a minimum. Nevertheless, capital charges in a rapidly expanding area were a matter of grave concern.

He would like to refer to an investigation which he carried out a year or so ago. One of the new towns to be built in the Watford Division was sited adjacent to an existing population of some 6,500, and the new town was planned to grow to 60,000. Estimates of planned expenditure and its incidence for all purposes were made, and estimates of consumption were forecast as accurately as possible. They took 130 therms per domestic consumer per year and assumed an industrial demand equal to the total domestic consumption. The results showed that in the first few years the capital charges rose to 7.6d. per therm, and over the next 15 years they fell to 5.7d. per therm. After the somewhat sudden drop, when pre-vesting assets were written off, the charges continued to fall steadily, levelling out at somewhere in the region of 4.25d. per therm at the end of the development period. Even that was about twice the pre-war cost of servicing capital expenditure. This heavy capital charge was not peculiar to the gas industry. The electricity supply industry was faced with the same heavy capital expenditure; hence the intensity of the competition they were facing in these new development areas. But it might be some comfort to them to realise that, since the period covered by the author's graph of relative costs,

G.J. No. 5024

A. B. Radley, Hove; P. Perkins, Frome; W. A. Perkins, Sherborne; D. S. Franks, Frome.

G.J. No. 5035

T. Wilkinson, Abercarn; C. Pritchard, Monmouth; C. B. Felton, Llandrindod Wells.

electricity charges had appreciably increased.

Dealing with the present rather than with the problematical future, he would cite the Hire Purchase Control Order and purchase tax as having a serious effect on their economics. They were in danger of losing the summer water-heating load, which could be met without incurring additional capital charges.

In the Watford Division, cost analyses showed that, owing to the incidence of peak demands, the total cost of gas, including interest and depreciation, for the summer was about 2.0d. per therm more than it was during the winter months. If it were practicable to apply seasonal price differentials, that would justify lowering the price during the summer months in order to create further sales.

The prominence given to coke in the paper was fully justified. At the present time coke accounted for about 25% of their total revenue, and, until complete gasification enabled them to offer gas at a price comparable with that of solid fuels, they must make every effort to expand the market for coke. In the past, coke had been considered to be a residual product; quality and sizing had received little attention, and there was much evidence that many people were using coke for domestic purposes only because of the short supply of alternative solid fuels. He thought that this was borne out by the number of Rolls-Royce cars and perambulators that had come to the works on Saturday mornings. However, there was a growing appreciation of the potentialities of the coke market, and forceful advertising could help them. But this business would be secured and held only when they could offer a fuel of consistent quality. This would involve them in additional capital expenditure, and the finished product might not attract a price immediately commensurate with the investment. But they had to meet the challenge of alternative solid fuels or add a further burden to the cost of gaseous therms.

It was regrettable to see to-day that the domestic grate designed specifically for coke was, presumably through the absence of their own advertising, boosted by their solid fuel competitor to the detriment of coke sales. He thought also that they would all have to pay increasing attention to the way in which coke grates were installed. Quite recently his attention was drawn to the numerous coke complaints they were receiving from a particular estate, and investigation showed that convector grates had been incorrectly installed by the builder. The tenants found it quite impossible to control the rate of combustion, and the first reaction was to blame the quality of the coke.

He was hopeful that necessity would create an impetus to develop the coke market and that the time would arrive when it would pay to use cheap low-grade coal in their own producers for retort heating and carburetted water gas manufacture.

He was not surprised that the author had referred to the increasing availability of coke oven gas and the consideration which would have to be given to this source of manufacture, but the arguments against the over-centralisation of gasworks plant as they knew them to-day applied with equal force to coke oven supplies. They must have due regard to the distance which the coke had to be hauled. The economics of coke oven gas supplies to the industry rested on a favourable price being obtained for coke at the ovens. When this market was saturated and coke had to be sent further afield the proposition became less attractive.

The author rightly drew attention to some of the less favourable aspects of a coke oven supply. If the gas was to be transmitted over long distances, a high load factor was necessary to secure the most advantageous terms and to keep down the capital cost of transmission. Unfortunately this in turn had the effect of reducing the load factor on the local manufacturing units, and capital charges would still have to be borne on idle plant. However, the Gas Act imposed upon them a duty to accept coke oven supplies when it was economical to do so, and naturally they would welcome every opportunity to lower their selling costs. But they must have proper safeguards. They must not lose sight of the fact that, when they accepted bulk supplies from an external source and both capital and labour were outside their control, they were adding further external influences to the future of gas. It would be much more satisfactory if the industry was allowed to build and operate its own plants at the pit-head. He did not think that 12 area boards could separately handle such projects, and they should therefore have to have something in the nature of a Production Board, the counterpart of the British Electricity Authority.

The prerequisite of gas and coke was an adequate supply of suitable coal, but for some years now they had been warned of the diminishing reserves of the best coals, and this year many of them had had to adjust their processes to meet the limitation placed on coal supplies. In such circumstances it was impossible to plan for economic production, and instead their efforts were directed to the best compromise that they could make.

It had now become increasingly urgent to face up to this state of affairs, and they must either design plants to gasify lower grade coals or blend coals. Large gasworks might find it possible and economic to incorporate a blending plant, but he doubted whether a medium-sized works could undertake its own blending. This might well be another function of the industry's Pro-

G.J. No. 5047

duction Board. It would be very interesting to speculate on the future of gas if they could use a wider range of coals and be as indifferent to the quality as their electrical competitors claimed to be.

Mr. H. D. Greenwood (National Coal Board) remarked that in these days, when it took so long to build new plants, fairly long-term planning was essential, and this must be based on the best possible estimates of future consumption. Not only was it essential to avoid excess capacity at the present high capital costs, but in some areas there was the additional problem of planning to absorb increasing quantities of coke oven gas.

As the author had said, the gas industry had based future demands for gas and the corresponding quantity of coal required on an increase of 3% per annum cumulative. The author suggested that this figure might be too high over a long period, although it might perhaps represent the present rate of increase.

He would like to consider the implications of these estimates on the future coal requirements of the industry. On the basis of the 3% per annum increase, the consumption of coal would, he believed, increase by about 6.5 mill. tons up to 1960. Over the same period the coking industry might require a similar additional quantity of coal. As was pointed out in the paper, the National Coal Board had stated that this additional tonnage could be made available only by the use of a larger proportion of the lower-grade and so-called marginal carbonisation coals.

He thought they might assume that the available coal would be shared out as fairly as possible, but the extent to to which the coal of lower coking value could be used for making the high-grade metallurgical coke was definitely limited. The coking and gas industries might therefore have to resort to coal blending in order to obtain satisfactory cokes from the types of coal which were available to them. In the coking industry this involved expensive handling plant, but in the gas industry it might mean changes in the type of carbonisation plants employed, since efficient blending involved the use of crushed coals.

These changes could take place only over a number of years, but they must be planned well ahead on the basis of future gas requirements. If gas sales increased at a rate appreciably below the 3% basis, the effect of coal availability on the planning and design of future methods of gas production might be less pronounced or perhaps might be postponed for some years. At this period of development, estimates—as accurate as possible—of future gas demands therefore seemed to be of fundamental importance.

The author had mentioned blending of coal and total gasification as methods of using lower-quality and possibly non-coking coals in the future. The effect of blending might fall most heavily on districts which had been accustomed to obtaining good-quality coal from adjacent collieries. Lower-grade coals were not always available in such areas and might therefore necessitate extra transport costs. It was possible that, if a proportion of the gas requirements could be met by complete gasification of non-coking coals, the present pattern of coal supplies might be maintained and the cost of blending and modification of carbonising plants reduced to a minimum. If large-scale coal blending could be minimised by meeting part of the increased gas demand by complete gasification, it might be reasonable to credit the saving effected to the gasification process.

There was another aspect of this problem which might be considered. At the present time large quantities of coke oven gas were used for heating ovens. If this was replaced by producer gas made from low-grade coal with high ash or high sulphur—coal which could not be used for making coke—a considerable tonnage of high-grade carbonisation coal could be saved. The use of producer gas on the National Coal Board plants alone, including those under construction at the present time, would allow the replacement of about 1.5 mill. tons per annum of carbonisation coal by

G.J. No. 5408

W. E. Settle, Crossley Bros., and John E. Williams, Ltd.

lower-grade coals. Continental countries were very alive to this problem, and various developments on these lines were in progress there.

The author was concerned about the increasing production of metallurgical coke and the possible effect of a falling-off in demand for this type of coke in future. It was hardly correct, he thought, to say that the National Coal Board provided the coke to meet only the fluctuating demands of the iron and steel industry, as the recent large expansion in the output of steel would not have been possible without the maintenance of coke supplies from the National Coal Board. They all believed that the output of steel must not be restricted by inadequate coke supplies, and the possibility of there being excess carbonising capacity, if in the future there was a falling-off in steel consumption, was one of the risks which must always be taken in an expanding industrial economy. The Gas and Steel Nationalisation Acts set out quite clearly how the various sections of the carbonisation industry must co-ordinate their future plans, but they might have also included, perhaps, some guidance on how the burden of an industrial depression should be shared out in the carbonisation industry! If, however, the demand for metallurgical coke decreased there might well be a reduction in gas demand at the same time, and perhaps the gas boards might be glad to take less coke oven gas in those circumstances.

He was very interested in the views expressed in the paper on the future availability of coke oven gas. He would confirm the author's assumption that there would be substantially more coke oven gas for disposal in, say, five years time, owing to the replacement of old by new plants, even if there was no increase in the quantity of coal carbonised. For example, it was estimated that by 1960 the National Coal Board would have for disposal some 75 mill. cu. ft. per day additional gas, on the basis of rich gas firing.

One of the major problems in disposing of this extra gas lay in the fact that it was concentrated in South Wales, Durham, and the Yorkshire/Derbyshire area. Coke ovens were sited primarily with regard to coal and iron ore supplies and the location of coke markets, which were not always most convenient for gas disposal.

In South Wales coke oven gas would constitute perhaps 75% of the total gas supply in that region, and in the East Midlands and Durham it might constitute perhaps over 50%. If coke oven gas was regarded solely as base-load gas, the load factor in gasworks plant became progressively worse as the percentage of the coke oven gas increased, and the position might well arise when it became impossible to meet seasonal demand variations unless the quantity of coke oven gas supply could be varied. In Continental countries, where coke oven gas was often the only supply, arrangements had had to be made to vary the output by alternate rich gas and producer gas firing, by using gas for steam and power generation, and by having consumers who could change over to other fuels at peak load periods.

In this country there was a tendency to take the view that additional coke oven gas arising from the increased steel output must be absorbed in the existing districts where, broadly speaking, it had been customary to use coke oven gas. The absorption of such additional gas might involve shutting down existing plant at gasworks or using such plant at uneconomic load factors, or, alternatively, selling gas at very low prices. He felt that none of these solutions was necessarily in the best national interests, and that they might follow the Continental methods and take this gas further afield. Mr. Rose, in his paper in 1951, suggested, for example, the possibility of the Eastern Gas Board taking gas from coking plants in the Midlands, and it might well be found that the transport of coke oven gas to districts well away from the coalfields was the most economic solution of the problem. Anyway, the best solution obviously had to be worked out for each area in which there was coke oven gas for disposal, and he felt it was necessary that they should examine where coke oven gas could be most efficiently and economically used.

Then there was the controversial question of the method of arriving at a fair price for coke oven gas. Coke oven gas was a by-product of the coke oven

process, and personally he knew of no recognised method of costing coke oven gas. He agreed, however, with the author's proposal that in each case of coke oven gas supply the gas board should work out two alternative schemes, one with and one without coke oven gas. If this was done and the estimates tabled for discussion between buyer and seller, he thought that much of the protracted negotiation which often took place might be avoided.

Having formulated what appeared to be a fairly straightforward principle for assessing the value of any coke oven gas supply, the author proceeded to show how difficult it would be to arrive at the cost of any scheme involving the use of coke oven gas. He felt that his main concern was about the commitment for long periods for a large proportion of the supply and the relative inflexibility of such arrangements. Nobody could foresee what conditions might arise in the future, but it seemed to him that it should not be impossible to formulate an agreement to provide for buyer and seller getting together and working out how the burden of any unforeseen future changes should be shouldered by the parties concerned.

Mr. Sydney Smith (Chairman, East Midlands Gas Board) said he was particularly interested in the author's observations in the section of the paper on 'The Influence of Increasing Availability of Coke Oven Gas,' and he would suggest that certain figures therein might be enquired into a little more fully. The author said: 'When the ovens are fired by producer gas there will be twice as much gas available for sale as when they are fired by coke oven gas.' He (the speaker) was afraid that this statement was open to question, as, with a modern battery, rich gas underfiring absorbed about 40% only of the total gas made.

Again, the author quoted figures which led them to the conclusion that, with producer gas underfiring, 50% more gas would be available for sale than with rich gas underfiring. These figures were obviously quoted as the yields from two batteries, but he suggested that they were far too optimistic. In a modern battery carbonising South Yorkshire coals, a total rich gas yield of about 70 therms per ton could be expected. Forty per cent. underfiring would give a rich gas availability of 42 therms per ton, which, at a calorific value of 500 B.Th.U. per cu. ft. purified, would mean 8,400 cu. ft. per ton, or 16,800,000 cu. ft. per day, with rich gas underfiring, from two 1,000-ton batteries. With producer gas underfiring, this could be increased to no more than 28 mill. cu. ft. per day.

His main concern, however, was with the author's suggested bases of charge for coke oven gas. He would suggest that 'manufacture in new gasworks plant'—if by this the author meant conventional carbonising plant used on a gasworks—should not enter at all into the calculation of costs. Gas could be manufactured more cheaply in coke ovens than in any other type of carbonising plant of conventional design.

Why then should any gas board pay more for coke oven gas than the price at which they could make it themselves in similar plant, operating on a 95% load factor, at or near the point of usage? In his opinion, there was no valid reason why a gas board should not put down coke ovens and, indeed, manufacture domestic and industrial coke, or even metallurgical coke, perhaps to be marketed in consultation with the National Coal Board. Also, if an independent owner of a coke oven chose for his own convenience to put down a plant on a site remote from the point or gas usage, it might be considered that the price to be paid for gas should have some regard to the capital charges which the gas board had to meet on long lengths of transmission mains.

It should also be remembered that gas could be sold in increasing quantities only at prices which were economical by comparison with other fuels, and that, for this reason, the price to be paid for coke oven gas must also have regard to the price at which markets could be found in which it could be sold.

The author rightly made reference to the hazards presented by a scheme of development incorporating purchased coke oven gas. Obviously the greater the proportion of purchased gas the greater the hazard. Although in the East Midlands they had been extremely fortunate in having splendid co-operation from the National Coal Board and from private owners of coke ovens, they had not been entirely free from embarrassing reductions in gas deliveries in the depth of winter, when, at a time when their own plants were being pushed to the limit, heavy rains or heavy snowstorms had quite seriously affected the outputs from the coke ovens. They had also been faced on occasion with H_2S on the district, due to breakdowns of purification plant at the ovens and to accidents in the operation of valves.

The fact remained that gas boards alone were responsible under statute for the manufacture of gas supplies to prescribed standards of quality and pressure, and, in the negotiation of prices, it might not be a bad idea for gas boards to consider the desirability of incorporating an element of 'risk money' as an offset against the hazards inseparable from supplies of this nature.

Mr. H. Johnston, in reply, said that the theme of the argument was that the time had arrived when there was a new target, and that it required careful aim. Naturally he did not expect full agreement with all the views that he had expressed, but rather the contrary. Many important questions and points had been raised, and he felt that he could do more justice to them if he replied to them in writing.

G.J. No. 5050

W. Foster; N. G. Appleyard, Leeds; A. McDonald, North Eastern Gas Board; W. Kirk, Motherwell.

G.J. No. 5056

F. H. Wilkinson, George Waller & Son, Ltd.; W. Oldham, Furness; A. H. Dyer, Newport, Mon.

Abstract of I.G.E. Communication No. 423

MODERN PROBLEMS IN

FURNACE HEATING

by **R. J. SARJANT,** O.B.E., D.Sc.,

Professor of Fuel Technology, University of Sheffield

THE paper reviews some of the modern problems of furnace heating from the point of view of the user. A discussion is given of the trends in the use of fuels alternative to town gas, with some reference to new work on the mode of heat release from coal in combustion chambers. Instrumentation and mechanisation are regarded as essential features of modern gas-fired furnaces, which have thereby some advantages in this respect over alternative fuels. A broad outline is given of the modern problems in furnace design. Some experimental work in this field is outlined, and reference is made to the application of modern mathematical methods to the assessment of heat distribution in the furnace structure and charge.

The purpose of the paper is to review some of the modern problems of furnace heating from the point of view of the user. It is recognised that the gas industry is not concerned only with the restricted function of supplying a standard gas to industrial and domestic consumers. What may be termed the process aspects of the industrial use are matters of very real concern to the industry, and if research and development should show the way to the development of new forms of distributed gaseous fuels suitable, say, for groups of industrial establishments, then such progress would be of equal importance. It is assumed, also, that the gas engineer is interested in knowing of the developments in the use of fuels that are alternative to gaseous fuels in furnace practice, so that he may be aware of the nature of the competition that he must meet. Again, from the character of the carbonisation process, it is inevitable that the industry must be regarded as at least a two-fuel industry. The provision of coke for industrial as well as for domestic purposes carries points of technical interest in the present context.

Heat Resisting Steels

The advances in the use of modern heat resisting steels have assisted mechanisation and provided the metallic recuperator, better burners and effective valves. The furnace can readily be put in the production stream and operated automatically at its optimum rate of output, and it is to be realised that of all the means of producing efficient operation the control of rate of loading is far and away the most important. It is the author's firm opinion that until the efficiency—load relationship of a furnace has been cited, a scientific definition of the performance of the furnace has not been stated. Just to refer to the performance of a furnace in terms of x cu. ft. of gas used per lb. of material heated is to give an entirely inadequate picture from an efficiency point of view. Remarkably high thermal efficiencies in continuous gas-fired furnaces with adequate recuperation have been obtained, of the order of over 40% and even 60%. With modern hot face insulation and with recuperation, intermittent batch-type furnaces can be operated with thermal efficiencies perhaps not as good as these, but with a challenging effectiveness, when the overall picture of flexibility and adaptability has been taken into account.

The function of modern instrumentation is to enable an efficient set of operating conditions, once established by experiment or by plant survey, to be maintained. Two courses are open, one to rely on indicating instruments, the other to make the plant fully automatic. One disadvantage exists in regard to the latter course—namely, that the operator tends to leave everything to the instruments, and so there is not brought into operation at the critical moment the best of instruments, the human brain.

With the marked progress now achieved in instrumentation of all types, a self-contained automatic unit is readily obtainable to operate all the major controls that are required in normal furnace practice. Indeed, for certain types of heating, an almost standard combination has been established. For the typical reheating furnace, in which control is required to be governed from the measurement of temperature, the combination is: temperature measurement, through a controlling element, regulating fuel rate of flow; air/fuel ratio control operating from the measurement of rate of fuel flow; draught measurement in the furnace chamber controlling the exhaust draught damper. Thus there are three elements: (i) the master controller; (ii) the combustion control; (iii) the furnace draught regulation.

Controllers

(i) *The Master Controller.*—Such a control may be operated on any measured variable, a temperature, pressure, liquid level, or other physical property that may be a critical feature of the process. In a glass furnace, it may be the fluidity of the glass, or the response of some mechanism to changes in the properties of the material heated. A change in magnetic properties of a metal is a case in point. The main measuring instrument is usually coupled to a recording instrument, which provides the main record of the furnace performance. The function of the master controller is to formulate the signal that is required to be sent to the servo-mechanism operating the valve or other controlling mechanism. A considerable measure of scientific thought may be put into the formulation of this signal. It has become a specialised branch of instrument construction, since it involves consideration of the various types of change that may be required, thus proportional, derivative, integral, or desired combination.

(ii) *The Combustion Control.*—In many furnaces, the measurement of temperature will supply the control of fuel flow, which is recognised as the prime factor of efficiency. It may also be a matter of gas composition; for example, the measurement of oxygen as may be necessary in a critical sintering operation. Again, while the air/fuel ratio control may safeguard the combustible mixture, the extent of air inleakage is best indicated by a recording gas analyser.

(iii) *The Draught Control.*—The measurement of pressure at an appropriate point in the furnace chamber chosen to correct for gas buoyancy is made by a sufficiently sensitive mechanism, actuating the main exhaust damper through either electrical, pneumatic, or hydraulic amplification. In the case of balanced draught, such an arrangement may be made to operate input and output.

In these instruments increasing use is being made of electronic devices of all kinds. Groups of components are more readily and rapidly made interchangeable. Perhaps the most useful development of all is the general purpose

Continued on p. 685

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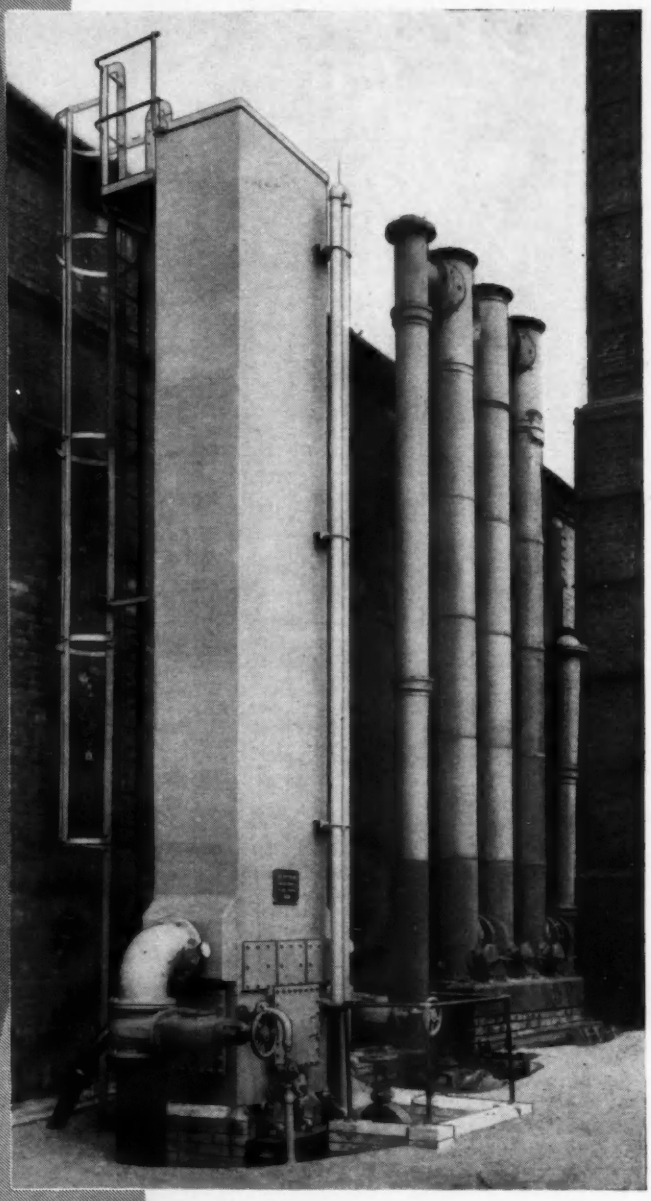

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control unit, an essential adjunct of the master controller, which is capable of addition to existing measuring instruments.

As important almost as the instrument are the means to be taken to maintain the mechanism and to interpret the readings. Reasonable workshop provision and adequate personnel, whether provided internally in a works or by outside service, are absolutely essential for the best advantages of instrumentation to be obtained. Indeed, an instrument is virtually useless unless it is well maintained. With these safeguards the optimum performance of heating plant can be ensured, for good maintenance of instruments is inevitably coupled with good general maintenance.

Among the modern developments in furnace instrumentation may be considered the application of fuel-blast control to gas producers. The normal instrumentation of gas producers had included the use of measurement of pressure of the offtake gas to regulate rate of flow of blast, air/steam ratio control, and assisted manual control of rate of fuel feed from the measurement of the temperature of the offtake gas. The remaining problem was to obtain fuel-blast control. A notable achievement in obtaining a successful issue was the result of a collaborative effort of research association, instrument maker and user (the British Coal Utilisation Research Association, G. Kent and John Baker, and Bessemer). In this method the fuel feed may be controlled automatically from either steam or air flow, and the measurement of the temperature of the offtake gas serves to provide a secondary adjustment to ensure a constant quality of gas-make. The result has been to provide a combination of gas producer and furnace, operating in complete unison.

At the other extreme in furnace practice is the case of the small furnace, in which the economics of the operation will not admit of any but the simplest forms of instrumentation. The general case should be regarded as one in which the furnace is designed to carry out a specific heating schedule of a standard load. Then, with a clean gas of regular quality, the pyrometer and the gas governor will provide a remarkably efficient performance if the draughting arrangements have been adequately designed. An essential requirement also is a consistent gas density.

DISCUSSION

Dr. D. T. A. Townend (Director, British Coal Utilisation Research Association) said that the author had given devoted attention to furnace heating for some 30 years and his contributions were always authoritative. But this year marked his retirement from the Chair of Fuel Technology in the University of Sheffield, and in recognising the outstanding work he has done there during the past six or seven years he was sure they all joined in expressing the hope that they would have the benefit of his wide experience for many years to come.

In the paper he had given a most useful cross-section of many of his interests and an account of much of the work he had been doing in the University, and this was of no little value to the gas industry, particularly because of the rather intimate picture that was presented of recent developments with competitive fuels.

In brief, the paper covered new aspects of the mode of heat release in the combustion of coal and coke, bringing out in particular the importance of turbulence as an accelerating factor; the great advantages of mechanisation, modern instrumentation with automatic control; a new approach to the pattern of heat release in an experimental reheating furnace, the results of which could not fail to influence furnace design in the future; and mathematical devices for assessing the heat absorption by the furnace structure and by the load.

In discussing smoke emission, Professor Sarjant stated that in the experimental work with which he had been connected, smoke from coal as the fuel could not be reduced if the temperature of the combustion chamber fell below 750°C. This agreed with B.C.U.R.A.'s own laboratory work on the ignition of coal volatiles; and to the designer of coal burning plant surely it was a most useful finding, since smoke elimination was being attempted on many pieces of equipment, domestic and industrial. In the Lancashire boiler, for instance, much of the surface seen by the reacting gases fell below this temperature.

Professor Sarjant went on to discuss the aerodynamical conditions which existed inside a combustion chamber or furnace. They all knew of the striking picture obtained by Chesters and Thring and their co-workers, and by Hayman, in models of furnaces, and how comparatively small modifications of the flow conditions could bring about a profound change in performance. Similar effects also took place in boilers where poor mixing of the gases could account (at least in part) for severe deposits on the hot gas-side of the tubes in water-tube boilers and—it was thought—for high side-flue temperatures in Lancashire boilers.

He also stated that 'the future of coal burning possibly lies in developing a coal burner—rather than a so-called coal stoker—in which the aerodynamical conditions in the flame reach a state of turbulence far in advance of what is known on the present stoker.' In this connection there was evidence that on a small chain-grate stoker inside an economic boiler, high burning rates (about 80-100 lb. per sq. ft. grate area per hour) with consequent conditions of great turbulence within and above the fuel bed, could result in almost smokeless combustion of bituminous coal, with little more than theoretical air. They heartily agreed with Professor Sarjant on this point, and he would remember the development of the down-jet burner which had proved a useful and efficient appliance with coke. There was also the instance of the over-fire steam jet system designed to create turbulent conditions over a boiler fire to promote and maintain ignition of fuels normally difficult to ignite—*e.g.*, coke breeze. Moreover, control of flow pattern over a highly rated fuel bed of coke breeze might indeed result in virtual elimination of grit.

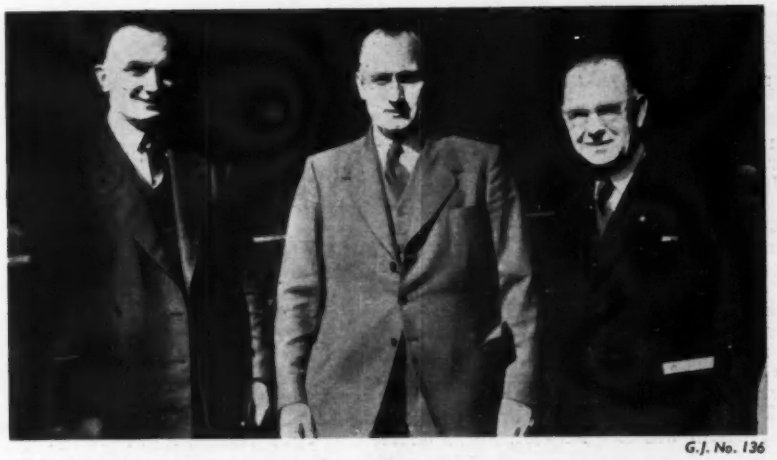
Turning now to the description of the experimental reheating furnace, Professor Sarjant showed that air/gas ratio control was not better than the range 4.5-4.7 to 1. In this he showed that the field was open for improved controllers—as well as better control of specific gravity—a factor of inestimable value where precise control of furnace atmosphere was required. He could add that the same difficulty arose some years ago in some small furnace experimental work at Leeds.

In his investigations into the control of secondary air, the turbulent or aerodynamical conditions were again emphasised as dependent upon burner design; and in turn secondary air velocity might control the pattern of heat release.

In conclusion, it was obviously difficult to do justice to such a comprehensive paper in short compass. Suffice it, therefore, to add that in the later passages of his paper Professor Sarjant, in discussing the mathematical aspects of his subject, made clear to them that

G.F. No. 137

A. F. Yates, Goole; F. Beaumont, Mablethorpe; T. Watson, Rushden.



G.J. No. 136

J. R. Hunt, Bolton Group; H. Penkethman, South Lancashire Group; R. J. Bradshaw, South Lancashire Group.

no student of furnace practice should regard them as too abstruse or upstage.

Mr. B. Withers said he had been in touch with Dr. Sarjant and had had the pleasure of assisting occasionally Dr. Smith in the experimental furnace, and it was on that particular aspect that his interest lay.

Concerning the series of temperatures of hot gases taken at different horizons within the furnace, it was particularly interesting that the gas adjacent to the stock was actually cooler than the stock for some 50% of the length of the furnace. This was a point which showed the necessity of incorporating the correct burner for the design of the furnace in question.

In fairness to the burner which was used on that furnace, the experiment was carried out with the burner working at only about half its capacity. If it had been at full capacity, it would have created sufficient turbulence within the furnace to prevent the actual cooling effect almost on the waste gases as they progressed down the furnace.

Secondly, the point that Professor Sarjant had mentioned, that the last quarter of the furnace received only 20% of its heat from the hot gases, was one which must be borne in mind by any furnace designer. In actual fact, on the usual type of reheating or continuous heating furnace that situation was almost overcome by the expedient of bringing the roof lower down so that the gases were washed over the stock, and in that case he thought more heat would be given to the stock from the gases than this 20%.

Finally, on the matter of continuous heating furnaces, it had been his experience that they were built and designed to be continuous, but in practice they were very seldom continuous. There were stoppages for 101 causes. This was unfortunate and unavoidable, but for the poor furnaceman the time of restarting after a stoppage was usually shrouded in mystery. The furnaceman made an obviously hopeful guess as to when they were going to start; he might be right or he might not be. The result was that when the mill came on again he had his stock too cool or else he had it too hot, with the obvious ill-effect of burning some metal and having to reject it. In this case he (the speaker) felt it was essential for the furnace designer to fit the type of burner that could produce at a moment's notice, by adjusting it, a very short hot flame so that he could get intense heat at the outgoing end of the furnace immediately so that he could start again, or, alternatively, if as on the Continent was often the case, lean gas was used, then he would suggest that there should be fitted to the furnace a dual type of burner, similar to that which Dr. Sarjant was using in the experimental furnace, whereby an alternative fuel could be used, either oil or tar. That could be done, and if it was done the furnaceman could use either one or the other or a combination of both, and so overcome this difficulty.

As furnace designers they appreciated very much the point that had been so clearly defined—that so much heat was transmitted to the stock by re-radiation. They would find this of great use in the future.

Mr. E. A. K. Patrick (North Thames Gas Board) remarked that the industrial utilisation of town gas had a very high diversity factor. Those who were engaged in the design and development of industrial gas equipment found very few standardised applications of gas, and they hoped this would be remembered by those who were able to concentrate large resources on the solution of a few major problems, as, for example, fuel utilisation in the open hearth furnace, reheating furnaces, etc. Results of work such as was being carried on at Sheffield must be presented in as general a manner as possible if they were to be able to use it. They needed to know, always, what happened if the scale of operations was varied. Were Professor Sarjant's furnace to have its length halved, what was the effect on conditions within the remaining half? The lengthwise re-radiation in the furnace was proving important, and if the length to breadth ratio of the furnace were severely altered, although most other factors would remain unchanged, this lengthwise radiation would be considerably changed.

When this work was finally written up for publication, therefore, could Professor Sarjant give them his results in the most versatile possible form so that they could endeavour to apply them to all sizes and shapes of appliance, since they could seldom conduct individual researches on even a tenth of the designs which they had to tackle, and must therefore rely on basic data.

A furnace with its burner must be designed as a complete unit, and it was wrong to build a furnace and then tack on the nearest available burner. Recent experience in the application of work on flow patterns had made them feel more strongly on this point. They knew that the environment of the burner could have a profound effect on its performance, but the attitude which Professor Sarjant so rightly deprecated was by no means dead. It was met with in all fields, but increasingly as the operating temperature fell.

In his section on instrumentation, Professor Sarjant set out three elements which, together, comprised a complete instrumentation of an appliance. The first he called 'the master controller,' controlling fuel input in relation to the demand of the process. This was commonly met with. The second, which he called 'the combustion control,' was, in industrial gas practice, represented by the air-gas proportioner or pre-mixing compressor where such were used, but in many industrial processes this controller was missing. The third stage—namely, 'the draught control,' was, in industrial gas practice, the Cinderella of this group, and greater use of it could make a useful contribution towards fuel economy by reducing ventilation when fuel input was below the maximum, and could also be very valuable in assisting atmosphere control in heat treatment furnaces.

Mr. H. R. Hems (West Midlands Gas Board) commented that to some extent he was disappointed with the paper. In a few generalisations on alternative fuels, Professor Sarjant said: "As a first generalisation, it is possible to apply almost any fuel to any furnace problem.' He went into the whole problem in a very big way, and made them realise that the gas industry was only one small part of the whole problem. Then, on liquid fuel, the author said: 'Where town gas is cheap, oil is excluded, and *vice versa*, provided the question of sulphur and refractory wear does not tip the scales the other way.' He wished that Professor Sarjant had indicated that in his experience this mainly referred to the larger class of furnace installation as found in the Sheffield area, in which he had lately worked, and further North, and to some extent in some of the other areas. It would have been useful if Professor Sarjant had, from his vast experience, taken a look over the whole of gas utilisation on the industrial side and given them a lead as to the lines on which they should concentrate.

In another place quite recently it has been said that the fuel industries should select that particular work for which their fuel was especially suitable. The gas industry within the last 12 months had been plunged into the deep end of competition, and while they were still having restrictions on coal supplies, and still had the circle of rising prices, one of their principal competitors had immense new supplies at recently reduced prices. These remarks added point to Professor Sarjant's opinion that the problem was one of straight economics. One dreaded to think what the result of a big fall in consumption could be.

Under the heading 'Mechanisation—Heat Recovery—Load Factor,' Professor Sarjant had said: 'Just to refer to the performance of a furnace in terms of x cu.ft. of gas used per lb. of material heated is to give an entirely inadequate picture from an efficiency point of view.'

(*Continued on p. 697*)

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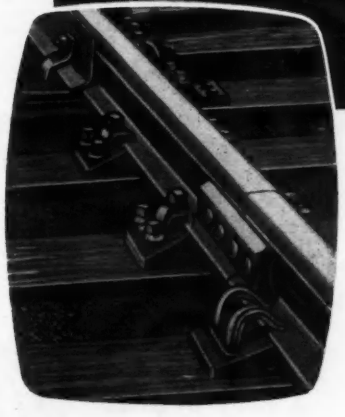

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INSTITUTION OF GAS ENGINEERS

The Gas Industry in America

MR. J. H. DYDE, who led the Team, in opening the discussion on the Report of the Productivity Team representing the British Gas Industry, which visited the United States of America in 1952, said that having regard to the scope of the report, the time available would allow for little more than a general airing of views, and he hoped there would be opportunities for further discussions at district levels in which the members of his Team would be willing to take part.

They had derived some satisfaction from the space allotted by and the reasoned reporting of the national Press and the larger provincial papers, and in particular they were indebted to their own Gas Press, for the issues that had so far come to hand had been full and fair in their comment. Indeed, they have taken up the pointers so well that it was really not necessary for him to reiterate a summary of their findings and recommendations. Rather would he try to bring out some points which might lead to a better understanding of the report.

In the first place, it represented the unanimous views of the Team. They desired that it should do so. It was obvious, if they considered the composition and character of the Team—of any Anglo-American Productivity Team, in fact—that there must be shades of opinion, in the reconciling of which what might otherwise be firm recommendations watered down or 'reasoned down' to 'suggestions' or 'matters worthy of consideration.' Nevertheless argument and joint consultation on problems that confronted them had, they hoped, produced a responsible document which they trusted the industry would consider seriously.

The structural and economic backgrounds of the British and American gas industries were in such sharp contrast that they felt it desirable that readers on both sides of the Atlantic should understand this in order to get a proper appreciation of the report as a whole. Chapter 2 was devoted to this matter.

Chapter 3, dealing with organisation and management, was factual reporting. In reading this chapter it was well to bear in mind that, apart from major legislative changes such as were exemplified in this country by the Nationalisation Acts, organisation was largely an evolutionary affair resulting from and changing with highly complex circumstances and economic pressures. What applied there might not necessarily apply here.

Again, there was the subject of loyalties. Loyalties played a fundamental part in the success of any organisation. The loyalty of an employee of Consolidated Edison Company of New York, Inc., Cincinnatti Gas and Electricity Company, or Consolidated Gas, Electric Light, and Power Company, Baltimore, was not to a sectional interest but was given to the company as a whole.

He would like them to consider what they said in the conclusions of the report about the closely integrated services of the American combination utilities. They suggested that much might be learned from them and that a closer study than they were able to give of their organisation and operational methods would be worth while.

Natural gas predominated the economy and operation of the American gas industry, and they recorded relevant facts concerning it. In so far as natural gas itself was concerned, there were no appreciable known reserves in this country, but a discovery of any magnitude would be of immense value to their national economy, and it was suggested that prospecting, where there was any possible hope of success, should receive vigorous support.

On the production side one of the main objects of their visit was to gain first-hand experience of how the American industry had made use of the products of their oil refineries—liquefied petroleum gases—and the heavier oils.

Until the receipt of natural gas within the last year or two, the big companies on the Eastern Seaboard made large quantities of carburetted water gas and, by their operational methods, had secured considerable increases in the output of orthodox plants, and made use of the cheaper heavy fuel oils. Mr. Edward Crowther brought back useful information on this subject from the United States in 1946. The Team had augmented that information by going round and patiently seeking it out from those who had most experience. It was a passing phase and, as a consequence, much useful data were never recorded in the annals of the American Gas Association. It was hoped that the detailed information given would prove of value to the industry. Plant cycles, operating conditions, and so forth were recorded in the appropriate appendices. They had made use of appendices in order to afford additional information for those interested in particular sections of the report.

In the field of gas distribution the Americans had unrivalled experience, and considerable feats of engineering skill and ingenuity had gone into pumping natural gas at very high pressures (100 lb. per sq. in.) over vast distances.

As would be expected, mechanical aids and new techniques had been developed to accelerate mainlaying operations. The incentives to introduce similar measures in this country would come with the further extension of gas grids in this country. There were, however, a number of these mechanical devices as well as techniques which could with advantage be introduced for mainlaying in new towns and large housing estates, as well as for inter-linking mains.

But perhaps the most important feature that came to light in the study of American gas distribution practice was that of applying special measures for protecting mains and services against corrosion to secure greater life. They had only fringed the subject in this country, and were well behind the oil industry in its development. In particular, by means of cathodic protection the life of underground steel tubes and mains might be greatly extended.

The outcome of such measures would lead to

(1) an extension in the use of steel in replacement of cast iron, with a consequent reduction of some 50% in the use of raw material;

(2) a reduction in depreciation rates could be applied which would have the effect of lowering the cost of long-distance transmission of gas.

Such developments would appear to be in the national interest.

Time would not permit him to make even brief reference to other sections of the report. He hoped that the discussion which followed would keep to those topics in the report which were within the Charter of the institution.

In concluding, he would like to pay a tribute to the members of his Team. It would be quite invidious to

mention names. Some by virtue of their background had probably been able to contribute more materially than others, but each one of them had played his part and done his share. They all gave unsparingly of their best in their efforts to produce a Team Report and one worthy of the industry. He could not have had a more likeable or happier band of colleagues on an enterprise that none of them would ever forget for the interest and experience it afforded.

Whatever the gas industry might think of the report, he thought he might well end with these words from the American Mark Twain in 'Huckleberry Finn': 'There was things which he stretched, but mainly he told the truth.'

DISCUSSION

Mr. Edward Crowther, C.B.E., Chairman, Northern Gas Board, said he had the opportunity and privilege some seven years ago, through the good offices of the Institution in very large measure, of making a short visit to the U.S.A. covering a small fraction of the ground which the Team had covered and meeting one or two of the leading personalities whom they met. Seven years was a long time in the history of an industry, particularly one that was developing at the pace of the gas industry in America. Nevertheless, some of the portents of the matters that were brought out in the report were perfectly visible at that time.

He thought they might be very proud of the Team that they sent to the U.S.A. to represent the gas industry. The work they had done and the report they had presented threw enormous credit on the gas industry of this country and the report would be as well received in the U.S.A. as it would be here There was in the report an enormous volume of work; they had to read not only the lines but between the lines.

The potential value of the report to the industry in Great Britain was very great. He used the word 'potential' because clearly the value of the report to them depended on the amount of study given to it and the degree to which they applied its lessons. Unless they gave it all the study it deserved—that is, almost unlimited—then the Team would not be properly rewarded for the work they had done.

He was interested to see, and rather puzzled by, the comparisons given for the relative costs of cast iron and steel mains for moderate pressures—*i.e.*, pressures below 50 lb. per sq. in. For track mains in this country the balance of cost was still slightly in favour of cast iron, and so long as that was true and so long as the great majority of their work did not demand pressures in excess of those that it was proper to apply to cast iron pipes, it seemed to him that cost would determine which of these materials they used, rather than the question of how much ferrous metal either of them might absorb.

He would like to know from the Team whether cathodic protection was being applied to cast iron in any considerable degree, as it undoubtedly was to steel pipelines.

He was very interested to see the handling of the water gas plants in the U.S.A. His first impression was one of complete shock. He looked at a plant which he assessed at something like 3 mill. or 4 mill. ft. per day, and found that it was turning out between 8 mill. and 10 mill.—and, of course, he wanted to know why. In large measure it was due to the higher blast pressures they were applying. When he came back, he did not find any conspicuous readiness on the part of the manufacturers on this side to step up pressures very far on water gas plants. Whether that was due to the fact that the coke was lighter than the hard coke generally used at that time in water gas plants in the U.S.A. and that they were afraid of blowing it out of the generator through the rest of the plant, or what the reason was, he never really determined.

The extended use of oil in these plants, both in generator and carburettor, was a second and very material cause of their high outputs, and that, as they knew, was applied in some degree in this country. As a matter of fact, it was an extremely efficient process financially, because at that time the Government were giving them oil free of charge beyond the normal quantity that they had been in the habit of using. Therefore, anybody who used twice as much got the second half for nothing for a year or two. At that time Mr. Edwin Hall, whom he had the privilege of meeting, was on the point of bringing to a successful completion his high B.Th.U. plant for the production of gas from oil direct. It might be that they would have to take a great deal more interest in those plants in this country.

The time seemed to be coming when they would either have to get together with the oil industry and absorb some of their heavy oils from the refineries, or else have to compete with that oil in other directions. There was a case here for careful discussion between the two industries before they decided that competition was to be the order of the day.

Liquid petroleum gases were already developing at an enormous pace seven years ago, and had, of course, developed very rapidly and progressively ever since. He still wondered whether in this country their most profitable use might not be for picking up peak loads on their large undertakings rather than for the complete or partial replacement of the production of smaller units. It was attractive, of course, to think in terms of sending out this gas neat through pipelines. They had to be careful, of course, if there was a high proportion of butane in the L.P. gases available. It was necessary to think about low temperatures in the ground which might cause those gases to revert to liquid form and upset the application on those lines. In such circumstances, a mixture of air and butane was perhaps the right thing.

With regard to natural gas, his own personal hope and belief was that they should endeavour to look very closely at the recommendations made by the Team and try to find definitely whether there was any possibility of coming across deposits of natural gas in this country. It was abundantly clear that such discoveries would be of enormous importance to them. A parallel investigation would seem to him to be that of underground storage. They were prepared to pay enormous sums of money for miserable little tin containers holding a few million cu.ft. of gas; if they could find a hole in the ground that would not leak and would hold several hundred million cubic feet of gas, it would make an enormous difference to their economy, because they could work their plant on base load. It was just as important to get 100% load factor on their gas-making plants in this country as it was to the pipeline companies in the U.S.A. to get 100% load factor on their trans-continental transmission lines.

Methane from the coal measures, of course, was very interesting, but it suffered from one disability, and he did not see how that disability was to be avoided—it was always likely to be mixed with a certain proportion of air, which made its handling less satisfactory than the handling of natural gas, which was near enough straight methane.

G.J. No. 140

On the question of office methods, billing, and accounting, the Americans had one big advantage; they had not any prepayment meters. Prepayment supplies were extremely expensive to install and to administer. Surely they had now reached the point where people were in the main, at any rate, credit-worthy in this country and did not need to collect pennies and shillings from day to day. If they could get on to 100% credit accounts, then mechanisation would really begin. In the recent Gas Act, he felt it was most retrograde that in the third schedule the consumer should be given absolute discretion to select either a prepayment or a credit supply as he pleased. He hoped that some day that

G.J. No. 5049

W. J. Marshall, Bawtry; Dr. M. Barash, East Midlands Gas Board, S. C. Bentley, Oxford; A. H. Barrington, Stretford; A. W. Attwood, West Midlands Gas Board.

schedule would be excised from the Act, so far as that particular provision was concerned; and that they might get rid of these expensive coin mechanisms and get on to 100% credit accounts, with mechanised billing.

Mr. W. K. Tate (General Manager, Eastern Division, Southern Gas Board), said it was difficult not to be overawed by the immensity of the figures presented where, with rather less than double the number of consumers in the United Kingdom, the gas sale was some 17 times as high, while one natural gas company alone, the Southern California Gas Company, provided thermally 80% as much gas as the whole of the gas industry in England, Scotland, and Wales at a revenue only one quarter as great. This disparity in proportionate financial yield per therm tended to disappear, however, where manufactured gas as they understood it formed a substantial proportion of the total output, and this was indicated by a study of the comparative figures for the North Thames Gas Board and the Consolidated Edison Company of New York.

The next staggering fact was the level of natural gas at 93% of the total quantity distributed. It was no wonder that, within limits, the American gas companies could cultivate a seasonal peak of tremendous range, assisted as they were by a growing deveolpment of spectacular underground storage ever nearer to the point of demand, although even they adopted expedients to control this peak which, at first glance, would seem distasteful and even commercially unsound.

While the seasonal range of daily output could be as much as 10 to 1, and was always high compared with English experience of, say, 2 to 1, the heating load was so widespread and prolonged that the hourly load factor was much improved and the ratio of maximum hour to maximum day was reduced to 1 in 15 as compared with, perhaps, 1 in 6, which was not uncommon in Southern England.

A modified climatic peak load was available to them, and he did not altogether share in the wave of caution on this subject which had been mounting in this country although, happily, the crest seemed to have passed and a return to more adventurous thinking to be upon them. Apparently in the United Kingdom they had, at the moment, no natural gas, and, from exploration so far carried out, no fruitful results had been obtained. Therefore, while such investigation should be and was, indeed, being pursued with the full knowledge and more of the gas industry, the omens were adverse and the alternative must surely be to press on with research into complete gasification plants for the utilisation of coals that were likely to remain plentiful and economic for some time to come. Indeed, there were continental plants well known to them that had done this job satisfactorily for many years, and their relatively wide-scale adoption here would seem to be worthy of immediate practical action.

America had the problem of dwindling reserves of natural gas. They had an even more pressing problem of dwindling measures of first-class carbonising coals, and notwithstanding the availability of oil he was a little disappointed that, in the U.S.A., complete gasification did not seem to be accorded the future importance one would expect. The development of the process here would be their salvation, and the successful incorporation of liquefied petroleum gas as the enriching agent would seem to be an answer to the continued distribution of gases with characteristics at least approaching those which they knew today. Perhaps, therefore, in the end the rapid development of the oil refineries in this country might prove to be a boon of the first order for the gas industry and not only the birth of yet one more serious competitor.

He would recommend most strongly the chapter in the report dealing with utilisation. It was a pleasure to find that, in so many fields, practice was so similar and that Great Britain did not lag behind. Nevertheless, the development of such items as the meter bar and the almost universal use of pressed steel for equipment, even of the heaviest nature, were points worthy of close study, and the latter in particular stressed yet once more the desirability of distributing a sulphur-free gas with which America was so fortunately endowed at present.

Effluent disposal in this country was now commanding—and rightly—ever-growing attention and resources. Was it too much to ask that, in parallel, they once more renewed their attack on that perpetual menace to efficient appliance operation and good consumer service—sulphur?

Mr. T. C. Finlayson (Woodall-Duckham Co.) said it had been his privilege to visit the United States on a number of occasions, each time with some definite technical mission before him; but each time some unexpected facts had been revealed which often outweighed the purpose of his original mission.

The Report of the Productivity Team, which was a remarkable document in its breadth, showed that the Team went with the intention of absorbing as much information as they could over a wide range of subjects. When considering the significance of the report, it was very difficult to appreciate that gas manufacturing plant in America was rapidly becoming almost superseded by natural gas and that at the present time virtually no retort installations, very few water gas plants, and probably half a dozen or so coke oven plants were at work in America solely operated for gas undertakings. In fact, he believed that there were a number of cases in America where the gas undertaking which supplied the gas to the consumer owned neither the source of natural gas which it supplied nor the pipeline through which the natural gas was transmitted to the undertaking.

To the extent to which coal gas was made, it was interesting to note that the report showed that in the U.S.A. coal gas was made almost exclusively in coke ovens. The significance of this was that in America coke quality was regarded as being extremely important and that all coal charged to the coke ovens was carefully blended and crushed to give a charge of uniform quality and bulk density. Long before natural gas became the predominant source of supply, the American gas industry set out to supply coke of uniform quality and size to its customers; hence the great importance attached by them to the subject of coal preparation.

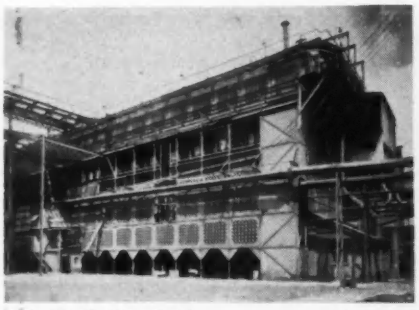
Mention was made in the report of the movable wall oven to deal with coals which might give rise to excessive swelling pressures. He thought it might be interesting to mention that a movable wall oven of the same design had been built by the British Coke Research Association at Pontypridd a few years ago, and that, in co-operation with the National Coal Board, all coals known to be potentially dangerous in this country had been examined and the results published in two reports issued by the Pontypridd Test Plant Committee.

The Report of the Team discussed at length the question whether coke ovens in America had a longer life than coke ovens built in this country. There was no doubt at all that the constant conditions under which coke ovens operated in America assisted in long life, but it should be remembered that the modern silica oven was only introduced into this country to any considerable extent in about 1925 and onwards. The statistics of oven life in this country had been materially influenced by the operation of ovens under wartime conditions of blackout and air raids. When one

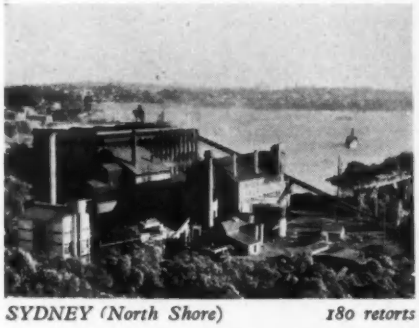
(*Continued on p. 697*)

EXHIBITION OF THE WORKS OF INDUSTRY
OF ALL NATIONS 1851
I hereby certify that Her Majesty's Commissioners
upon the Award of the Jurors have presented a Prize Medal to
T. Glover
for a Gas Meter
shown in the Exhibition
Exhibition
Hyde Park London, 15th Oct.r 1851
President of the Royal Commission

Makers of Prize Meters ever since —



SYDNEY (Mortlake) *496 retorts*

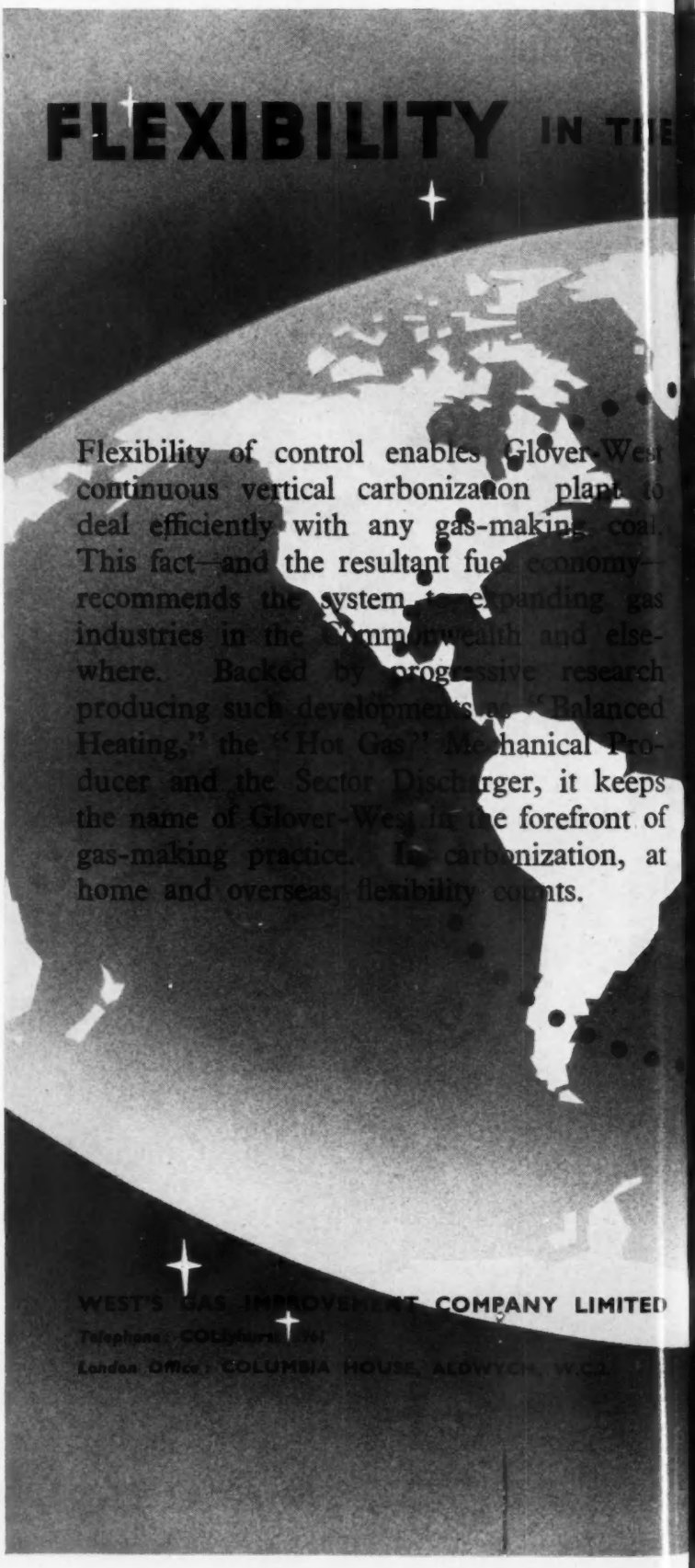


SYDNEY (North Shore) *180 retorts*

SOUTH BRISBANE *56 retorts*

FOOTSCRAY, Victoria *80 retorts*

BOX HILL, Victoria *60 retorts*


FLEXIBILITY IN THE
Flexibility of control enables Glover-West continuous vertical carbonization plant to deal efficiently with any gas-making coal. This fact—and the resultant fuel economy—recommends the system to expanding gas industries in the Commonwealth and elsewhere. Backed by progressive research producing such developments as "Balanced Heating," the "Hot Gas" Mechanical Producer and the Sector Discharger, it keeps the name of Glover-West in the forefront of gas-making practice. In carbonization, at home and overseas, flexibility counts.
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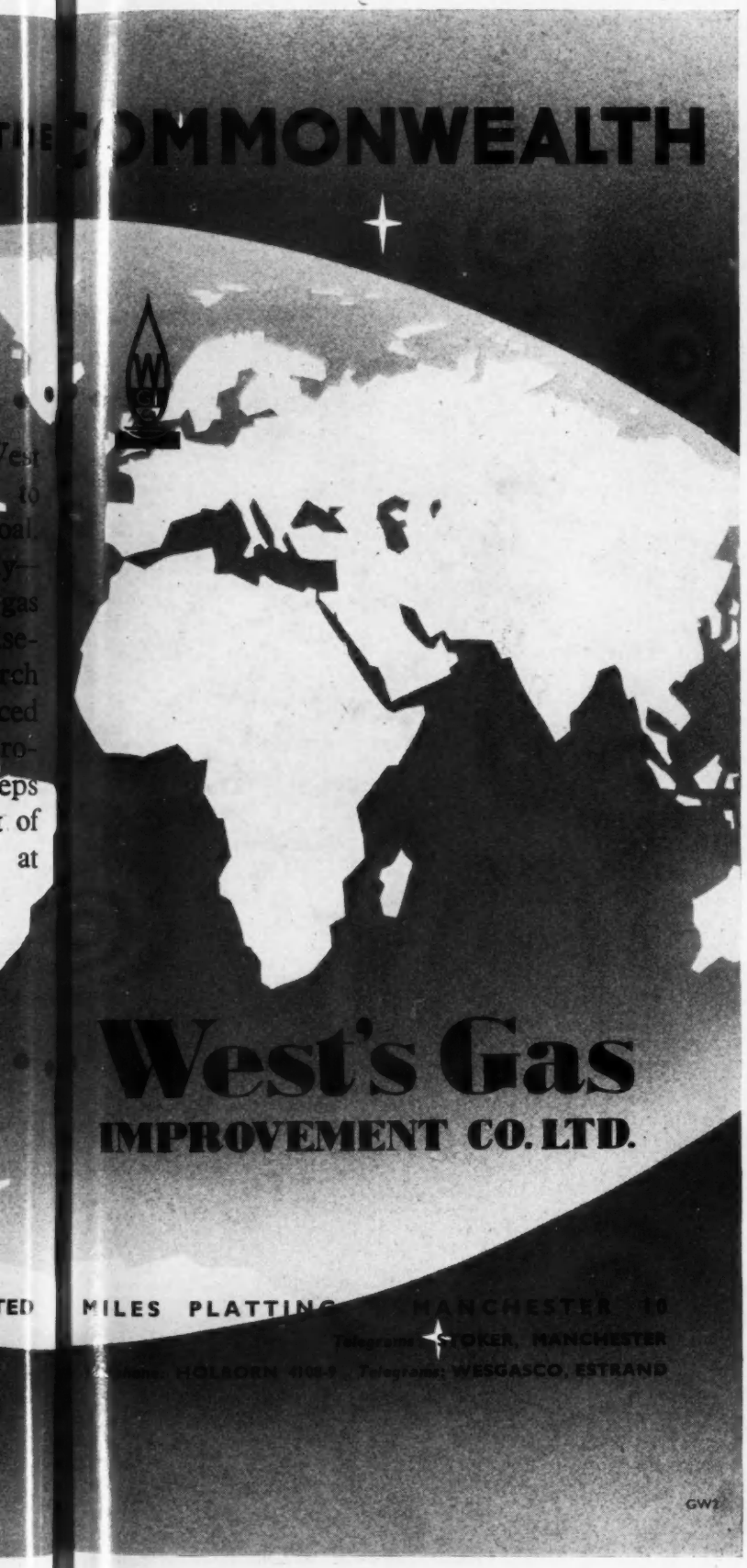
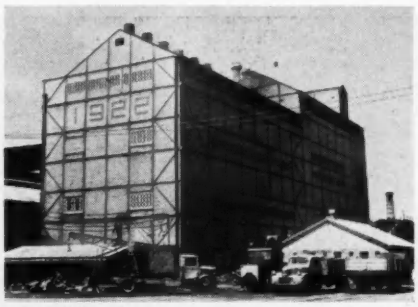
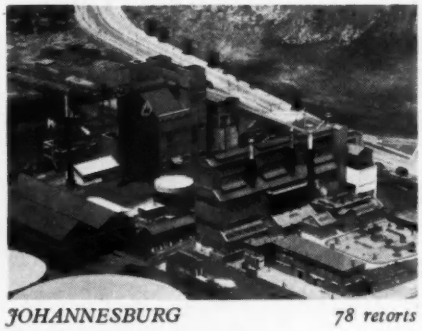




WELLINGTON *96 retorts*

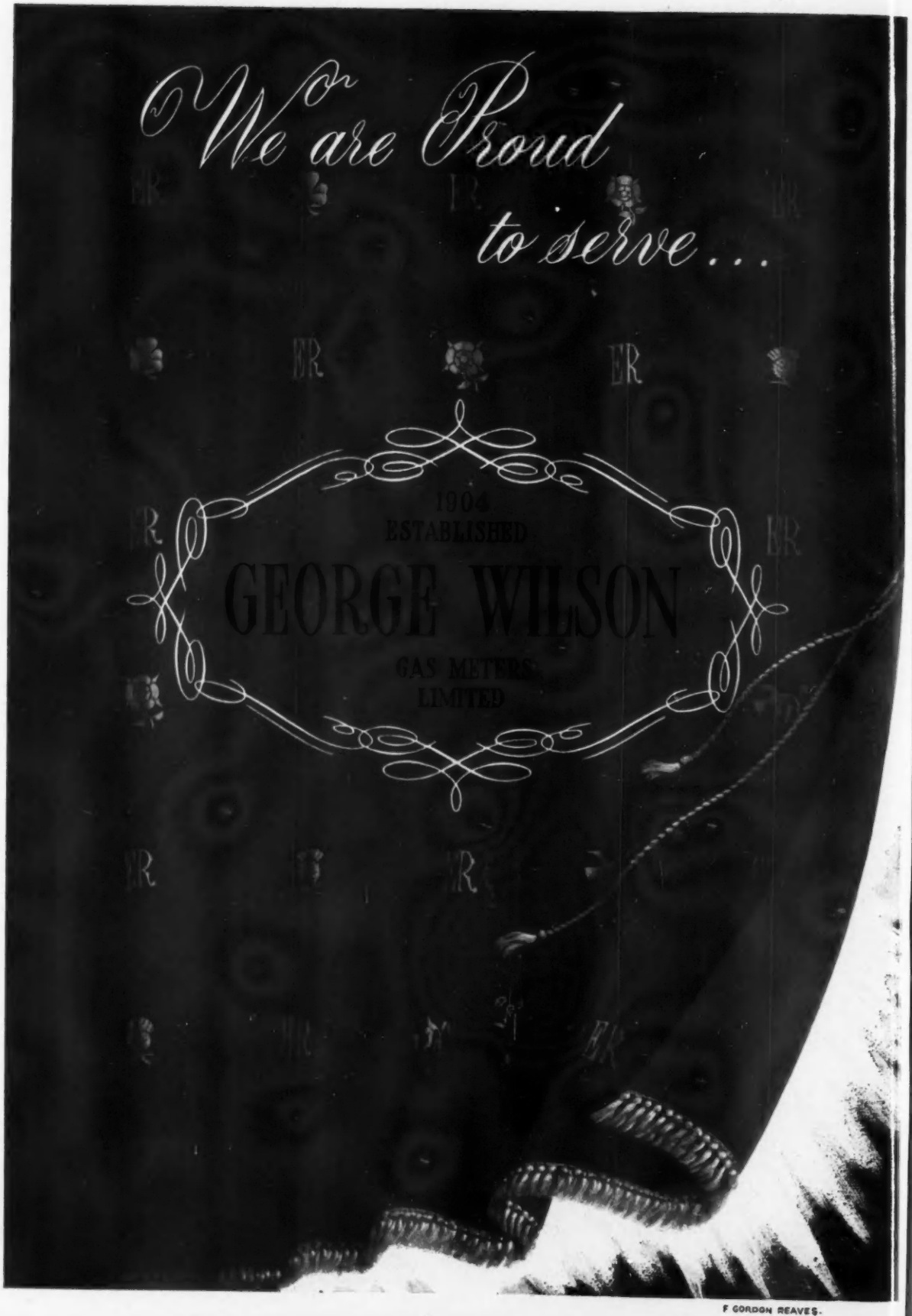
AUCKLAND *80 retorts*



JOHANNESBURG *78 retorts*

TORONTO *104 retorts*

HALIFAX, Nova Scotia *16 retorts*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remembered the special difficulties under which these plants in this country were maintained to give maximum coke output during the war—difficulties which were not shared by their American friends—he suggested that there was, at the moment, little reason or justification for associating the problem of oven life with the suggestion that British silica was not as good as American silica. In spite of war hazards, data were accumulating of a number of silica batteries in this country having lives of over 21 years.

Mr. W. H. G. Roach (William Press and Son, Ltd.) commented that the report stressed, on two occasions, that the Americans did not use incentive bonuses, but did not explain why. Unlike the British wage set-up, where national wage rates were used and the employer was bound to observe such rates, in America a rate was agreed as between the employer and the labour unions for any large project, and such rate took into consideration all the local difficulties and was high enough to attract and keep men on the job. There, far more than here where there was a shortage of labour, the principle of 'hire and fire' operated; in other words, if an operative did not make the grade he got the sack, and there were plenty to take his place. Here, on the contrary, with shortages of labour and a far more rigorous wage structure, they had to find means of increasing output per man-hour of an all-too-small labour force without the same deterrents, and it was Mr. Bevin during the war years who, and rightly in his view, forced his own trade unionists into accepting the principle of bonus on output which still persisted. This system suited their conditions.

He felt that in considering mechanical aids to distribution there was an economic angle which could not be stressed too highly Generally speaking, the higher the wage rate or the standard of living of a country, so there were more operations economically carried out by mechanical aids, and, of course, the converse was equally true. It was for that reason and the much greater scope of their operations that the Americans were ahead of them on mechanisation. The report was completely factual on this matter; in fact, it said that there was no evidence that greater mechanisation had increased productivity in urban areas. He took leave to differ here. The wise use of mechanisation could and did increase productivity in urban areas. On long cross-country runs, long by our standards but puny by their's, they had already learnt a lot from American enterprise, and this report would, he hoped, enable them to learn still more.

He was sorry that the report did not have more to say on the methods of letting contracts for distribution works. In America speed was usually the essence of the contract and rewards were given for a quick completion which encouraged mechanisation. The fixed fee target contract was very commonly used, and he suggested that many new ideas might be learned by a closer study of American methods of contracting.

Finally, there was one point he would like to make dealing with Appendix 17, which gave a series of tables of costs of installations, all based on man-hours, which was usual American practice. It should be pointed out what the cost of a man-hour entailed. In this country, where oil refinery projects were carried out on this basis, the cost of a man-hour, which included all site supervision, tools, travelling, insurances, and the like, and was based on a labour rate varying from about 3s. to 4s. 6d. per hour, worked out at 6s. 9d., to which were added mechanical plant charges, head office, and profit. Of course, on a straight mainlaying job, this figure would be reduced, but he made the point in case someone might want to use these tables without a proper appreciation of their significance.

Colonel Sir Harold Smith (Chairman of the Gas Council) at this stage made an important announcement which we give on an earlier page.

Furnace Heating—(*Continued from 686*)

Not one of them would disagree with him, but over the years they had had to quote that figure because, when it was obtained on a test either in a laboratory or particularly on a consumer's premises, it included all the standby losses due to the trade working to give a figure of direct interest to the prospective consumer. The actual efficiency of the furnace itself could be of a very different order. A speaker had already referred to the standby losses that could occur with a furnace, and it was only at periods of full loading that they could expect to obtain the highest efficiency.

Mr. L. T. Minchin said that the diagram in the paper showing the effect of secondary air would be very much more helpful if they could have a rough sketch of the cross-section of the combustion chamber showing just how the air came in and where. It was clear from the curves that the increase in the intensity of turbulence was causing a reduction in the smoke emission, though unfortunately they knew little about turbulence. Turbulence was not merely a question of intensity. The size of the eddies, the size of the scale of turbulence, were extremely important. During the war he investigated possible ways by which one might measure the scale of turbulence and the average size of the eddies, and they were all very hard to apply when it came to an actual flame, although they could be applied to a cold air flow. Nevertheless, he was sure they were an essential factor in combustion problems, and one of the big fields yet unexplored really lay in the nature of turbulence patterns in flames.

Professor Sarjant had commented on the difficulties of maintaining a constant air/gas ratio because of variations in specific gravity of the gas supplied. He (the speaker) always thought it was well to give a reminder to engineers concerned with the manufacture of gas of how difficult it was to maintain accurate and careful utilisation of gas if the specific gravity was changing in the way in which it did change in practice. If they could have had a constant Wobbe index this change of 4.5 to 4.7 which apparently took place even during the experiment would not have been so large.

Professor Sarjant, in reply, remarked that the question of a flame pattern had been mentioned by several speakers. They heard a great deal of efforts to get to know what was happening in a flame pattern by getting models. He remembered his efforts to try to apply a formula evolved by a Russian to furnace practice. When he came to work out the heat transmission (and it seemed to him that the only thing that mattered was where the heat went and what they did with it) and tried to relate the heat transmission to the flame patterns, it struck him that the flame pattern might be entirely over-ruled by the radiation. That was the point which has been the central feature of what he had been trying to find out.

They could lead themselves up a garden path if they said that the flame pattern was doing everything. It was very interesting to know the flame pattern, but when it came to a furnace like on open hearth furnace, where they had erosion which was determined not by the re-radiation but by the flow of the gases, then the pattern was extremely important and probably the guiding factor. But in furnaces where they could get any radiation, unless they had a luminous flame which was absorbing that radiation and carrying it about as the energy of the flame, then he felt that there was far more importance to be attached to the re-radiation. A lot of it could be calculated, but not all of it could be. They had tried to calculate it, but when they came to a luminous flame they got all sorts of funny things happening. Until they could calculate heat transmission by means of the pattern, the pattern was only a qualitative index.

G.J. 5059

R. Gillespie, G. Orme & Son; L. W. Roberts, North Eastern Gas Board; J. G. Tilley, Huddersfield; N. G. Appleyard, Leeds; N. C. Sturrock, Harrogate; J. M. McLusky, Wakefield.

Horizontal Retort Installation on Coke Oven Lines

By W. S. HUBBARD,
Production Engineer, Liverpool Group, North Western Gas Board.

IN a paper before the Institution of Gas Engineers at their annual meeting in Bournemouth, the author gave preliminary details of a horizontal retort installation with novel features. At that time the project was in its early stages, and it was expected that one bench would be completed by the end of 1950. This was nearly achieved, but the general gas-making position allowed the starting-up to be deferred until the second bench was completed, when the whole house could be put to work as a unit. The work was completed in July, 1951, and gas-making commenced in October of that year.

The new retort bench was built on the foundations of an old horizontal bench which was due for rebuilding from the foundations. This bench was one of three lying parallel, and it was not possible to modify the site to any great extent. For reasons which have been fully discussed on a previous occasion, it had been decided that all three horizontal benches should be fired by clean cold producers gas from a battery of four Power-Gas 10 ft. 6 in. diameter mechanical producers which were already installed.

The horizontal retort benches are operated on base load, so that any additional output would be an advantage and the existing mechanical producers were large enough to supply a bigger carbonising plant. The satisfactory performance of the rectangular horizontal chambers at the trial unit at Wandsworth confirmed the possibility of additional gas-making capacity, but experience to date had showed that orthodox refractory recuperators when both air and gas had to be preheated would only just give the temperature required for existing throughputs, and were rather extravagent in fuel. This led to choice of compound regenerators, not recuperators, in spite of the additional cost of the operating gear, and the necessity for a very clean gas, which was achieved by electro-detarrers working in conjunction with oil vaporisers, as developed by Dougill.

Layout of the Installation

The installation of the horizontal chambers was carried out by Gibbons Brothers, Ltd., and work from the foundations took just over 12 months. The existing stage floors, bunkers, and roof were in good condition, and the desire to retain these fixed the height to the top of the bench, and the depth of the regenerators, the latter proving rather too shallow, as explained later. The space available allowed for two benches, one containing 54 chambers and the other 48, built, as will be seen from the diagram, without division walls. Each chamber is 22 ft. long 27 in. high × 12 in. tapering to 13½ in. wide. The benches are of monolithic construction, designed to rise and fall as units, the chambers being integral with the walls, with full provision made for expansion following coke oven practice. The chambers are built in banks of three high, buckstays and Congdon type offtakes being placed between alternate banks. The installation has the appearance of a retort bench above stage level, and of a coke oven battery below.

The Jenkins De Brouwer charging and discharging machine is the original one used for serving the 'D' section retorts. Several minor modifications were made—*i.e.*, increasing the belt speed and altering the shape of the pusher head to suit the chambers.

The hot coke conveyor is of the same size as was employed with the old bench—a De Brouwer endless chain running in a mild steel trough with cast iron liners. This trough was renewed when the bench was rebuilt. A travelling coke bus guides the coke into the conveyor.

The coal is fed into the charging machine from the existing overhead bunkers running the full length of the retort house.

The gas offtakes are of the Congdon pattern, one standpipe each side of the bench serving six chambers, with steel boxes at the base of each standpipe to give facilities for cleaning. The standpipes are connected by 6 in. diameter connections to an 18 in. diameter gas collecting main; equalising mains and oil operating relay type governors are provided on both benches. The liquor circulating system is orthodox, the tar and liquor from the standpipes returning to the separating tank housed in the cellars, from which liquor is recirculated by electrically driven centrifugal pumps. Free use is made of liquor sprays and surplus liquor runs away to the liquor well.

The cold producer gas enters the house through a 24 in. diameter main, an orifice type recording meter and a relay operated pressure controller into a 16 in. diameter ring main. This main is fitted with 12 in. diameter spring-loaded explosion doors discharging outside the house, and the producer gas is fed to the bottom of the regenerators through 5 in. diameter connections. The valve gear is operated by a Gibbons reversing machine driven by a 5 H.P. electric motor. Underground waste gas flues run along both sides of the benches into a central header flue, with control dampers and a hand operated main butterfly damper; from this flue the waste gases are drawn by induced draught fans into the existing main chimney.

Operation of the Plant

This house of regenerative horizontal chambers has now been at work for 18 months, and small initial troubles, inseparable from such a project, have been overcome. The results being obtained are all that were expected, and day-to-day operation presents no difficulties. The coal capacity of the chambers is between 20 cwt. and 21 cwt. and after modifications to the charging machine the chambers are well filled. This confirms results obtained with an experimental wooden chamber in 1949.

Zoning of the heat from front to back is satisfactory, but there is appreciable variation in temperature between the top and bottom chambers, and it appears probable that this is caused by the angle at which the gas and air mix being too acute and the top cross-over flue too low—factors which would be corrected on future plants. The chambers were started on a 12-hour carbonising cycle when the bottom chambers were over-carbonised; experiments with schedules as low as eight hours were tried, but it was found impossible to carbonise the top charges in this period. Finally, different carbonising periods for each level were adopted, and the benches have for some time been working with: Tops 12 hours, middles 10 hours, and bottoms 8 hours. With combustion chamber temperatures averaging 1,360°C. to 1,370°C. no difficulty is being experienced in carbonising the charges completely.

During the early trials much attention was given to the Jenkins stoking machine, and further modifications were made to ensure that full charges were laid and coal spillage reduced to a minimum. Various speeds were tried, and a modified impellor wheel with a wider groove gave some improvement, but the main factors are the speed of rotation and the velocity of coal down the telescopic feed chute. The use of a charging belt with cross-ribs was not successful. Spillage was reduced to small proportions by careful adjustment of the mask registering with the charging doors and care in ensuring the correct charging position.

Initial difficulties were encountered in handling hot coke

discharged from the chambers. The size of the charge was some 25% greater than had previously been handled by the conveyor, and an excessive amount of steam escaped into the retort house. This difficulty was overcome by installing water sprays at appropriate points along the length of the conveyor and by the erection of a steam discharge chimney at the end of the conveyor. Conditions are now much better, but not completely satisfactory, and consideration is being given to the installation of a Le Fleuve type conveyor.

Satisfactory Performance

The performance of the change-over gear for the regenerators is completely satisfactory. In this connection it should be noted that, at one point in the change-over, producer gas to the benches is completely shut off for a few seconds. There is no producer gas holder, but two recuperative benches take gas from the 24-in. main, so that there is no serious effect on the producer gas plant operation, although some increase in pressure is caused momentarily.

Regulation of combustion chamber temperatures, once the individual flues have been adjusted, depends on the control of producer gas pressure at 4 in.-5 in. water gauge, and of the draught in the waste gas flue at about 2 in. water gauge, and in normal operation there is little call for adjustment. The heat loss from the top of the bench caused some concern initially, but this has been reduced to reasonable proportions by laying an additional course of insulation bricks. This is important as the combustion chamber temperatures are taken from the top of the bench looking down the combustion flues, and in this connection it will be appreciated that as these temperatures alter about 80° between reversals, it is necessary for them to be corrected to a datum.

The fuel consumption is 41 mill. cu.ft. per week, at N.T.P., equivalent to 14 lb. of dry coke per 100 lb. of wet coal carbonised. This has been reduced from an original figure of 44 mill. cu. ft., the recording orifice type meter having been most useful in this respect. The temperature of the waste gases leaving the installation averages 400°C. This is some 100°C. higher than might have been expected—the result of the regenerators being shallower than theoretically necessary, due, as mentioned before, to the limits of height imposed by the existing coal bunkers and floors.

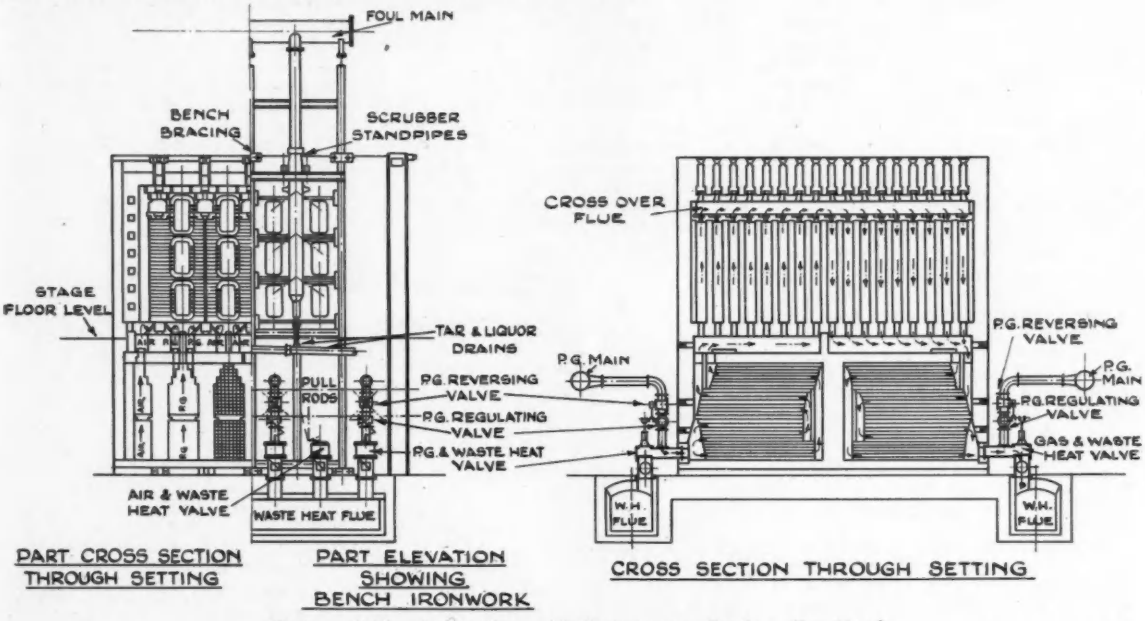
The throughput of coal on this installation is 255 tons per day against 150 tons per day on the bench before reconstruction, an increase from 1.6 lb. to 2.7 lb. of coal per sq. ft. of ground area per hour, or 70%.

The thermal yield from this installation using a mixture of Lancashire and Yorkshire coals is maintained at 71 therms per ton at a calorific value of 570 to 580 B.Th.U. per cu.ft. unstripped. Little definite information is available regarding the quality of the coke produced, but this appears similar to that obtained from orthodox horizontals, the rapid rate of carbonisation being against the production of a very hard coke.

The labour employed, including a proportion of the producer and coke bunker men, is roughly the same as a modern continuous vertical plant at another Liverpool works, and much lower than an old horizontal house.

Experience Summarised

Summarising the experience as given above, it could be said that this installation has fulfilled the expectations that led to its erection. It possesses the advantage of horizontal retorts of tolerance of coals that can be carbonised, and high calorific value of the gas produced. The fuel consumption is less than that of horizontal retorts fired by built-in producers, and it seems likely that this fuel consumption figure will be maintained for many years, which cannot be said for the average horizontal retort house.



Horizontal Chamber Settings with Regenerators, Producer-Gas Fired.

The New Barnet undertaking is operating recuperative chambers four tiers high fired from hot gas mechanical producers, and it would appear that the next regenerative unit should be built four high if conditions permit. This would give a good output figure per square unit of ground area, and as the capital cost of the Liverpool three high benches is less than that of ordinary horizontals of similar capacity, the corresponding figure for four high benches would be very favourable.

THE INSTITUTE of Municipal Treasurers and Accountants has issued its *Housing Statistics*, 1951-52. The return relates to nearly 500 authorities in England and Wales and is the third of its kind to be published. The following particulars are shown in respect of each authority: Number of dwellings in housing revenue account, showing separately those completed during the year 1951-52; the capital cost of houses completed during the year; summary of the housing repairs account, showing the average contribution to the repairs fund on pre-war and post-war houses; a summary of the housing revenue account, including the amount of the total rate subsidy per dwelling; and details of weekly net rents charged for two bedroom and three bedroom houses. Copies of the return are available from 1, Buckingham Place, Westminster, S.W.1, price 7s. 6d. (post free).

JUNIOR GAS ASSOCIATIONS

SCOTTISH (WESTERN) PRESIDENT'S DAY

MEMBERS of the Scottish Junior Gas Association (Western District) visited the Dumbarton gasworks on May 9 to celebrate Mr. A. McInnes's Presidential Day which had been postponed for two years due to the reorganisation and rebuilding of the works. Mr. Alex McFadyen, Sub-Group Manager, Dumbarton and Helensburgh, together with the acting President, Mr. A. McInnes, welcomed the visitors, among whom were Mr. D. F. Young, Divisional Controller, Mr. A. G. Smith, Deputy Divisional Controller, Mr. Athol Brown, Senior Vice President and Mr. W. Kirk, Hon. Secretary, Scottish Association of Gas Managers, Mr. R. A. Currie, President, Scottish Junior Gas Association (Western District) and several other senior officials from various undertakings.

New Extensions

Existing carbonising plant comprised 24 33 in. Glover-West vertical retorts each having a capacity of 60,000 cu.ft. per mouthpiece, equivalent to 1,440,000 cu.ft. per day. The maximum day's output was 2,200,000 cu.ft. The new extensions, when completed, will comprise 64 50 in. Glover-West vertical retorts with coal and coke handling plant, the nominal capacity being 6 mill. cu.ft. per day, with sector dischargers and mechanical producers. The coal bunkers have a capacity of 500 tons.

Newton Chambers & Co., Ltd., are responsible for the installation of the condensers comprising three units of 3 mill. cu.ft. per day each, one unit of which will be utilised for the existing stream. Two 16 in. by 39 in. H3 Holmes Connersville exhausters have been installed, and an electro detarrer (W. C. Holmes & Co., Ltd.), a Livesey washer and a static ammonia washer in two sections (Newton Chambers) have also been provided for, the capacity being 6 mill. cu.ft. per day in each case.

The purifiers comprise two sets each of five boxes measuring 40 ft. by 35 in. by 6 ft. 6 in. (Newton Chambers) while the station meter is a 16 in. by 48 in. Holmes Connersville. Foundations by the Bryden Construction Co. allowed a 5 mill. cu.ft. holder to be erected by Newton Chambers, this having been completed during last winter.

In the compressor house there are two electric driven variable speed compressors of 300 H.P., with a capacity of 300,000 cu.ft. per hour; one electric driven constant speed compressor of the same H.P. and capacity, with provision for another similar set. A 28 in. by 84 in. Holmes Connersville meter with a capacity of 800,000 cu.ft. per hour has also been installed together with a 30 in. diameter centifluctuator. All this apparatus will be used for the Dumbarton-Glasgow link-up.

Bulk Supply to Helensburgh

To allow for a bulk supply to Helensburgh, Bryan Donkin have installed one steam driven compressor of 75/80,000 cu.ft. per hour, and another one of 50/60,000 cu.ft. per hour, also a 2 in. diameter centifluctuator.

At the conclusion of the visit, high tea was provided by the Scottish Gas Board at the nearby Dumbuck Hotel, where Mr. A. McInnes gave a welcome to the guests. He also thanked the President and members of Council for having allowed him to occupy the chair on this occasion, postponed for almost two years.

Mr. D. F. Young expressed his pleasure at seeing such a large attendance. Many problems had been met at Dumbarton in the building of the new works and these had been shown on the photographs which were on display in the offices. The work was now proceeding satisfactorily and many difficulties had been overcome. He gave an invitation to the members to visit the Dawsholm gasworks later in the year.

Mr. Currie, speaking on behalf of the Association, thanked Mr. McFadyen for having made the visit so successful, and he also thanked the Board for its hospitality. He felt Mr. McFadyen and his staff would be justly proud of their new works, and he was sure that some members would incorporate some of the Dumbarton ideas in their own works.

Mr. McFadyen, replying, extended a welcome to the Juniors to return when the works was completed.

Annual Meeting

The 49th annual general meeting of the Association was held at Glasgow. In opening the meeting, the President, Mr. R. A. Currie, Glasgow, expressed his thanks to the members for their support during his year of office, but regretted that difficulty was still being experienced in getting members to come forward with offers to submit papers. The session on the whole had been quite successful, he continued, and he hoped that the same loyalty and support would be shown during the next session, when Mr. Alexander Walker would be President.

The annual report and accounts were approved, and the officers for 1953-54 were elected as follows: *President*, Alexander Walker, Motherwell; *Vice-President*, Geo. Royden, Tradeston; *Hon. Secretary and Treasurer*, W. A. Green, Paisley. *Members of Council:* R. Anderson, Dumbarton; G. Blackhurst, Granton; I. Campbell, Coatbridge; C. Campbell, Newton-on-Ayr; R. Currie, Glasgow (*ex officio*); A. Blackie, Paisley; W. Cummings, Tradeston; A. Kerr, Hamilton; R. Pearston, Uddingston; J. Murray, Greenock. *Auditors:* F. Hailstones, Glasgow; J. C. Greig, Dawsholm.

It was agreed to dispose of the Association's library in view of the lack of interest that had been shown over a period of many years, and Mr. James Hall and Mr. J. C. Greig were appointed to examine the books prior to their disposal.

Mr. James Hall, Hon. Secretary of the Scottish District Education Committee, gave an informal address on the educational activities for the past year. He was warmly thanked for his address.

Midland Annual Meeting

THE 47th annual general meeting of the Midland Junior Gas Association was held in Birmingham on April 28. The President, Mr. D. J. Ward, occupied the chair. On the presentation of the report and accounts the Treasurer, Mr. S. Brockbank, said on the receipts side the accounts compared very closely with those of the previous year. Subscriptions outstanding were within £10 of the previous 12 months and in spite of special appeals there was still an amount of £170 outstanding.

On the proposition of Mr. J. A. MILNER (Worcester), seconded by Mr. K. J. CRANE (Birmingham) the report and accounts were adopted.

Mr. J. A. TOMES proposed a vote of thanks to the retiring members of the Council, Mr. S. C. Bentley (Oxford), Mr. J. A. Foxton (Cheltenham), and Mr. W. J. Parsons (Birmingham). He said they had contributed their full share to the work of the Council and as two of them had long distances to travel that was sufficient evidence of their keenness.

Mr. H. J. REYNOLDS seconded and said they were losing valuable members because by the rules they must retire.

Two new members of the Council were elected, one for Birmingham and one for the district. There was one nomination for Birmingham, Mr. R. Kimble, who was accordingly appointed. He was proposed by Mr. J. PALSER (Birmingham) seconded by Mr. W. J. PARSONS. For district representative there were two nominations, Mr. A. Griffiths (Dudley) proposed by Mr. E. C. ROYALL (Dudley) seconded by Mr. D. A. VINCE (Dudley) and Mr. H. L. Fielder (Worcester) proposed by Mr. J. A. MILNER (Worcester) seconded by Mr. G. D. DUTHIE (Worcester). On a ballot being taken Mr. Fielder was elected.

The PRESIDENT proposed a vote of thanks to the officers and said although much the same words were used each year he wished to propose the resolution with all sincerity. The position of president would be untenable without the valuable support given by the officers and he appreciated their support during the past year.

Mr. TOMES seconded and the proposition was heartily carried.

Mr. REYNOLDS, in reply, said the work was certainly becoming more arduous but it was a pleasure to do it because one felt that it was appreciated by the members.

On the motion of Mr. D. J. O. BATH (Oxford) seconded by Mr. L. W. HATHAWAY (West Bromwich) the following officers were elected. Hon. Treasurer: S. Brockbank; Hon. Secretary: H. J. Reynolds; Hon. Auditor: R. L. Shaw, and Hon. Transactions Secretary: Mr. L. H. Hardy. There are four representatives on the Midland District Education Committee: W. Macnaughton, F. L. Atkin, W. Clarke and A. W. Sanders. As it is necessary for one to retire the matter was left to the council. It was announced that Mr. S. C. Crathorn (Birmingham) had accepted the post of Junior Vice President.

Congratulations were extended to Mr. K. Davis (Stoke on Trent) on winning the S.B.G.I. medal for a paper on the use of gas in the Potteries.

Two films lent by the Shell-Mex and B.P. Co. were shown. One was 'The Stanlow Story,' a documentary record of the development of the Shell refinery at Stanlow 1948 to 1952. The second film, 'Rig 20' is a remarkable film of an oil well fire and the methods adopted to extinguish it.

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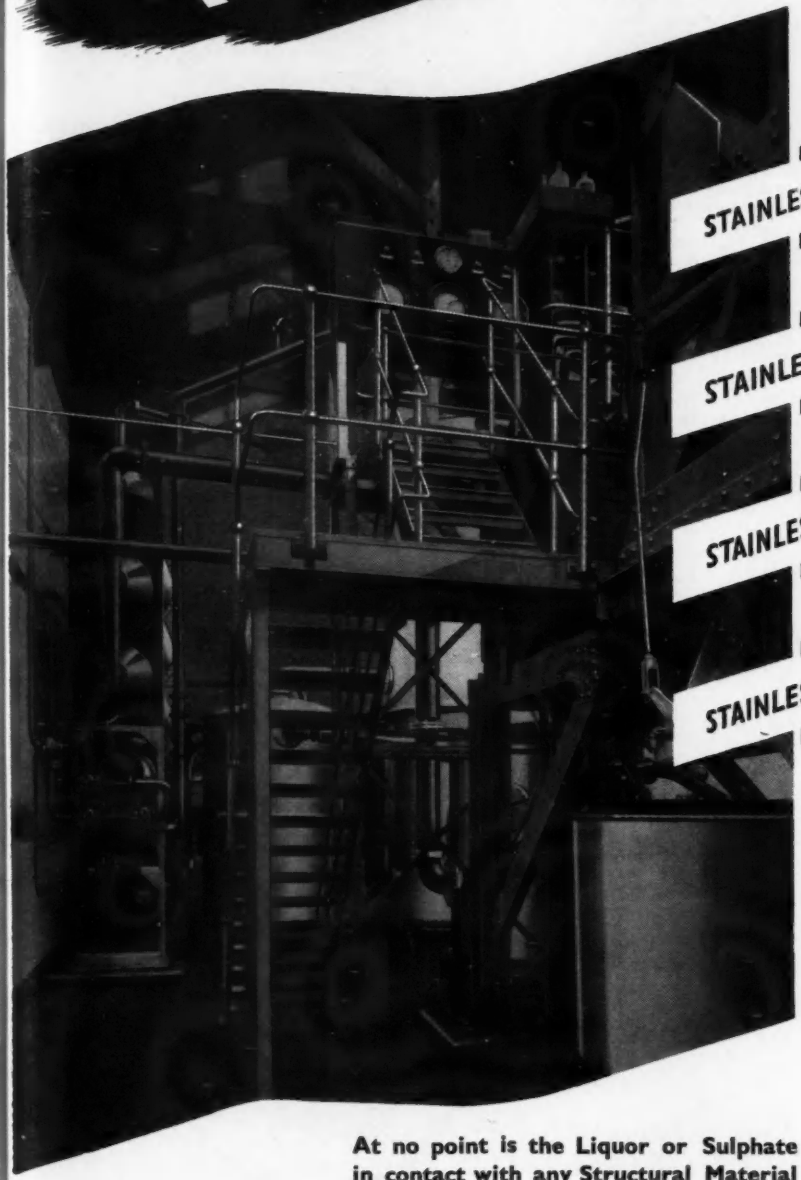

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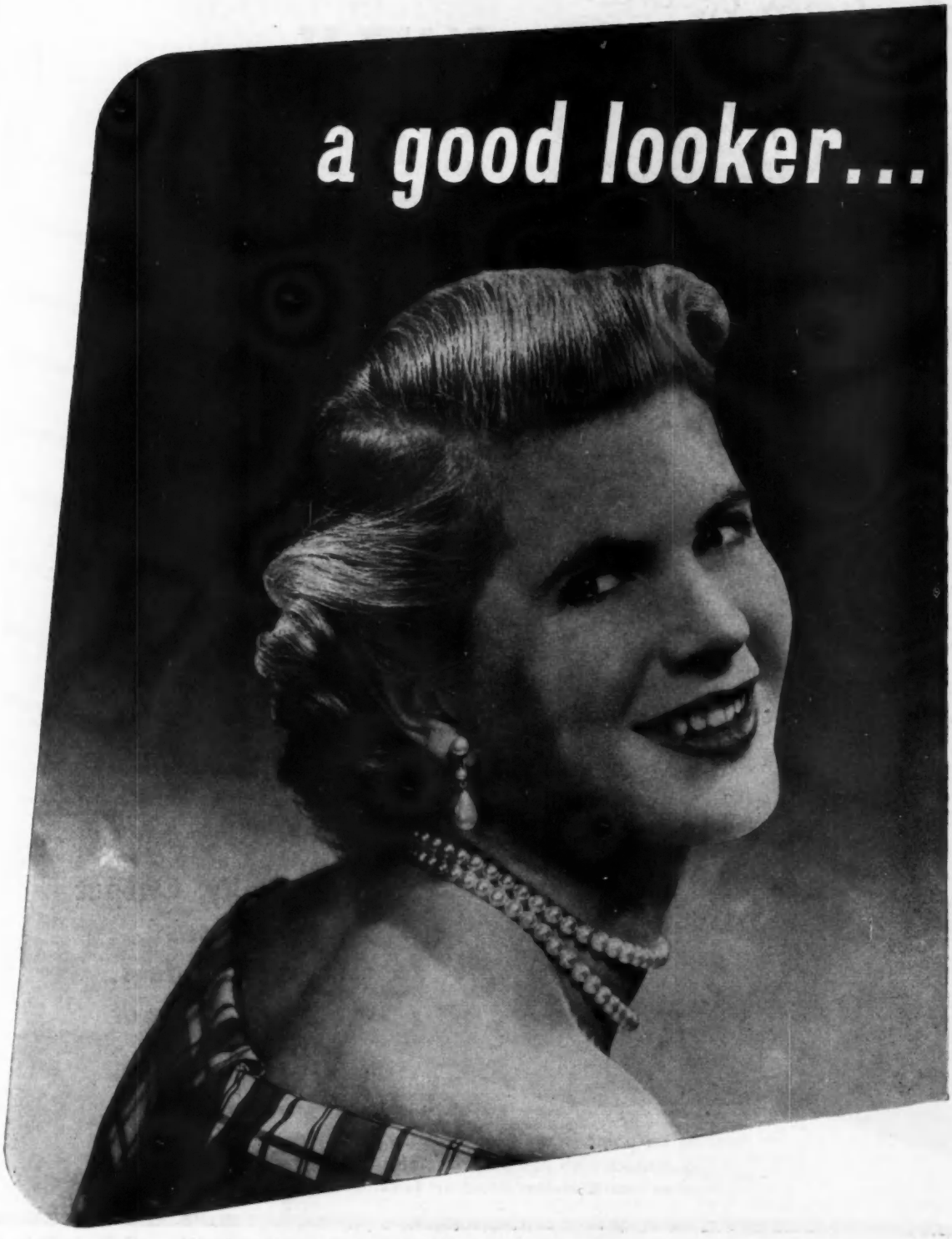
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Gas Officers Guild

HAPPY RELATIONS WITH GAS COUNCIL AND AREA BOARDS

THE seventh annual general meeting of the Gas Officers Guild was held at Church House, Westminster, on May 19. The Chairman, Mr. J. F. Rust (Newport, Wales Gas Board) presided; also on the platform were Mr. J. R. W. Alexander, Chairman of Executive Committee; Colonel R. H. Studholme, Solicitor; Mr. E. O. Rose (Tottenham, Eastern Gas Board), Vice-Chairman; and Dr. G. E. Foxwell, Secretary and Treasurer. The annual report and accounts were adopted, and the Chairman, Vice-Chairman, and Auditors (Kennedy, Smellie & Co.) were re-elected.

The annual report stated that in general the relations between the Guild and the Gas Council and area boards were happy. Many individual cases had been settled to everyone's satisfaction. Some cases that might be classified as mass disputes had been resolved by patience and good humour on both sides.

The Joint Councils

The work of the Senior Gas Officers Joint Council and of the National Joint Council for Gas Staffs, in both of which the Guild takes a prominent part, continued during the year. The Guild's work is conducted in many fields. At the top of the structure of negotiation are the national bodies. On the Senior Gas Officers Joint Council (S.G.O.J.C.) the employers have 15 representatives, the Guild 10 and N.A.L.G.O. 5. On the National Joint Council for Gas Staffs (N.J.C.G.S.), Mr. J. R. W. Alexander represents the Guild and two other bodies, all connected with the interests of professional people. From each of these two bodies have stemmed area joint committees or area joint councils. The formation of area joint committees of the S.G.O.J.C. in ten areas was a feature of the year. These committees are doing useful work in connection with local or area issues. There are many issues that must be dealt with nationally, as the officers side has always insisted, but the area committees have before them much work and great opportunities.

Rights of individual members have been protected generally by discussion between the Guild officers and the area board concerned, by support before grading tribunals or occasionally by legal action. As the year closed one case was entered for hearing before the Court of Appeal. The pension rights of members is a very considerable source of interest particularly since the details of the Gas Council's pension scheme have been announced. Such is the importance of this that the Guild has issued two bulletins on the subject and has taken the lead in the formation of a joint pensions committee to deal with the many difficulties that are arising.

Members' Rights

During the year the Council held seven meetings, and an executive committee of the Council met on many occasions to deal with current affairs and problems and to prepare reports for the Council. Among matters dealt with by the Council were cost of living salary increases, car allowances, constitutions of committees, etc., of the S.G.O.J.C. and N.J.C.G.S., position of graded chartered gas engineers, cash in lieu of emoluments, grading, pensions of individual members, Gas Council pension scheme, legal cases, and the maintenance of rights of individual members, salary scales, and the work of area joint committees of S.G.O.J.C. and N.J.C.G.S.

Membership of the Guild at March 31 was 1,194. The Guild lost 16 members through death. The Council appeals to members to use their influence to bring their friends and colleagues, professional officers in the industry, into the Guild.

The National Joint Council for Gas Staffs negotiated a cost of living increase in grade salaries of staffs to take effect from January 1, 1953, varying from £5 a year in the lowest grades to £20 a year in A.P.T. grades 7 to 12 for male staff with 80% of these rises for female staff.

On the question of car allowances for graded staff, the opinion of the Gas Council was that the provision of motor cars was not a condition of service but a matter for arrangement between the area board and the employee. If the employee was not satisfied with the terms proposed for the use of his own car, and he was not provided with transport by the board he could use the public transport and be reimbursed.

Overtime Payments

During the year there has been in operation a formal agreement on overtime payments for staff. The employers expect that staff will continue to work overtime voluntarily to complete work in progress, and in particular that A.P.T. staff should not be paid for overtime. When overtime is directly authorised through a responsible officer, however, a defined payment can be made, but mainly to clerical and similar staff who are not in membership of the Guild.

A number of grading appeals were disposed of during the year in which Guild members were represented by the Guild solicitor. In most cases the results were satisfactory to the officer concerned, and in certain of them up-grading by as much as four grades was secured.

An anomaly remained, keenly felt by many officers, in that managers and other senior officials who occupy posts coming within graded scales still have their terms and conditions of employment settled by the same machinery as that which deals with the junior staff under their control.

Referring to the Senior Gas Officers Joint Council the report stated that negotiations regarding cost of living salary increases for senior officers continued in the light of the failure of some area boards to recognise that the cost of living had adversely affected the higher ranks of officers. Although several general salary increases on a national basis have been granted since nationalisation to all employees with annual salaries not exceeding £830-875, no such increases have been granted nationally to officers with higher salaries.

Application by the officers side of the Senior Gas Officers Joint Council to remedy the situation overall has not so far been successful, even to the extent that all officers should enjoy similar additions to salary to cover the increased cost of living, the equated official index of which rose from 100 to 124 during the first three years of the nationalised gas industry. The contention that each area board needs to deal with salaries to meet its own circumstances and the position of its officers, individually and collectively, cannot justify considerable variation from board to board in the amount and incidence of any additions made to meet cost of living rises, which impose similar burdens upon all.

Cost of Living Increase

In the light of these facts, the matter had been raised in 1951, but in the absence of national implementation of the request for a review from the officers side, a request for a general salary increase for officers to meet the increased cost of living was made on June 26, 1952. This the employers side undertook to consider, but at the next quarterly meeting of the Joint Council they rejected the request on the ground that it was an area matter and not for the national body to consider. On being reminded that the constitution of area joint committees precluded them from negotiating general salary increases, the employers side agreed to reconsider their decision. Three months passed before another meeting could be arranged and in January last, the employers made a counter-offer. This was regarded as inadequate, but the employers side agreed to consider an upward modification suggested by the officers side. In March an offer was made by the employers to increase their counter-offer by £10 a year.

Proposals Rejected

The broad effect of the employers' proposals at this stage was that out of the total increase, if any, in salary granted to a senior officer for whatever reason between vesting date and December 31, 1952, £75 p.a. would be 'earmarked' as a cost of living award. Any total increase of less than £75 would be brought up to that amount. From January 1, 1953, £30 p.a. would be added to the national £75 cost of living increase, except that in those cases where more than a total of £105 had been added between vesting date and January 1, 1953, as an actual cost of living increase, no cost of living award of £30 would be given on January 1. The total amount of the cost of living awards actual or national given from vesting date to January 1, 1953, inclusive, were not to bring the gross salary of an individual officer above £2,500 p.a.

These proposals were rejected by the officers side, who then put forward a revised application asking for a general cost of living increase of: £125 a year on salaries up to £1,500 p.a., £150 a year on salaries over £1,500 to £2,000 p.a., and £175 a year on salaries over

(*Continued on p. 706*)

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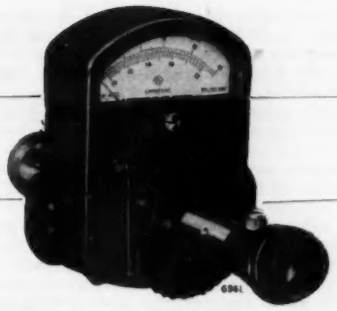

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Material Handling

MR. JAMES R. BRIGHT, M.S., M.A.S.M.E., Chief Editor of *Modern Materials Handling*, of Boston, Massachusetts, gave the James Clayton Lecture for 1953, on 'How American Industry is Attacking the Problem of Material Handling,' to members of the Institution of Mechanical Engineers in London on April 17. Mr. Bright emphasised that material handling is one of the fundamental activities of mankind, and a common denominator of all industries, yet it has been relatively neglected by engineers and management generally. In America, however, realisation is growing that material handling accounts for the largest single activity cost in manufacturing and distributing.

To illustrate the enormous importance of material handling to industry, the lecturer illustrated by means of a table the annual labour investment of hours in a number of major operations in a certain American plant. Time spent for material handling showed an annual labour investment of 8,113,060 hours, compared with the next largest operation, testing, which consumed slightly less than 4 mill. hours. He added that the hours shown did not include all handling, but only time recognised and paid for as handling labour. It could be assumed that 20-30% or even more handling was recorded by the accountant as part of the production operation.

Apart from expediting handling to reduce cost, industry has realised that handling is often the production bottleneck between processes and perhaps more important, handling for storage.

The lecture, given in London, was repeated in Birmingham, Manchester, and Glasgow.

Careers in Fan Engineering

FEW people realise the need for trained technicians in fan engineering. The lack of them is only too apparent when fan manufacturers seek new staff. Young men skilled in this branch of industry are scarce. Yet, paradoxically it is rarely found that firms who need men with this specialised knowledge encourage their existing staff to acquire the appropriate technical education, or to take refresher or post-graduate courses.

This branch of industry offers many opportunities and scope for interesting careers. The applications to which fans are put are incredibly extensive. Indeed, few other machines, if any, are used for so many and such varied purposes. Practically every industrial and commercial activity requires fans for one purpose or another.

Among those engaged in applying this knowledge there are many who understand their subject imperfectly. And young men with engineering degrees or technical college training seldom, if ever, bring with them a knowledge of this technology, widely needed though it is.

At one time this could be attributed to a lack of facilities for the technological education required. But today the necessary facilities exist. The National College for Heating, Ventilating, Refrigeration, and Fan Engineering was formed for this purpose in 1948 and established at the borough Polytechnic, London. The College provides for full-time Diploma courses in the subjects with which it is concerned, Associateship courses, and post-graduate Research courses.

K. & L. Silver Jubilee

THIS year marks the twenty-fifth anniversary of the association of K & L Steelfounders & Engineers, Ltd., with the '600' group of companies and May 2 was chosen as the official day of celebration. It was in 1928 that George Cohen Sons & Co., Ltd., the parent concern of the group, acquired the then struggling Kryn & Lahy Metal Works, Ltd., and proceeded to build up the very flourishing concern of 'K & L.'

Under its present Board, with Mr. George Levy as Chairman and Mr. F. W. Rowe, Managing Director, the Company has gone from strength to strength. Today K & L employ nearly 1,700 staff and workpeople. On May 2, at Letchworth, the guests numbered nearly 6,000, including many members of employees' families. At 1.45 p.m. the gala fields at Letchworth were officially declared open by Mrs. Cyril M. Cohen who was introduced by Mr. W. H. Morton (General Sales Manager of K & L. The field contained all the fun of the fair that you can think of. There were roundabouts, dodgems, chairoplanes, side shows of every variety, including 'ye olde coconutte shyes.'

'Hell's Angels,' trick motor-cyclists, performed astounding feats, and atop a 200-ft. flexible pole the Great Berny, who calls himself 'The Flying Dutchman,' climber to sway in miraculous fashion.

In a specially prepared arena, the King's troop of the Royal Horse Artillery twice performed a musical drive. Never before had this display been given at a private function.

Then there were three performances of Roberts Brothers' Circus. The 'Big Top' accommodated over 2,000.

£2,000 p.a., dated from August 1, 1952, and based on salaries ruling at July 31, 1952, credit being given for the amounts derived from any general cost of living increase granted by the Gas Council or an area board after April 30, 1949. It was specified that the increase should not involve any reduction of personal or similar allowances or of compensation, and should apply to all officers except those already excluded by agreement, or as the result of the ballot, from negotiation of terms and conditions of service through the S.G.O.I.C.

This proposal was rejected by the employers and a deadlock arose. The officers therefore required arbitration in the form of a reference to the Industrial Court in accordance with the constitution of the S.G.O.J.C. That was the position reached at the end of the year under review. The officers' case for the Industrial Court is now being prepared.

Sick Pay

The employers, in reply to representations by the officers side, did not feel justified in negotiating a separate sick pay scheme for senior officers, preferring to treat each case on an individual basis. They have undertaken, however, that the sick pay conditions already agreed for graded staff will be the minimum accorded to senior officers leaving the way open for more generous treatment when appropriate. Similarly, the employers have agreed to regard the maximum staff holiday entitlement as the minimum for senior officers, leaving area boards free to increase holidays in individual cases.

The employers have agreed that in the event of any officer being considered redundant, the area board concerned would consult with the officers' organisation as to the procedure to be adopted in dealing with the problem.

Representations were made by the officers side on the action of one board which used a general salary increase as a ground for reducing the statutory compensation payable to certain officers whose remuneration had previously been reduced. The employers side was not willing to discuss this matter unless it was referred to the Joint Council by the area joint committee. Since no such committee existed in the area concerned, a deadlock resulted and the board concerned was asked to discuss the matter direct with representatives of the officers side. This the board is not at present willing to do, but it is hoped that second thoughts may prevail, failing which recourse to arbitration can be required under the constitution.

A national joint conciliation panel to which disputed matters can be referred (appeals machinery) has been constituted and the following have been nominated to serve on it:—Employers: H. F. H. Jones, J. R. Bradshaw, A. Henshall, M. Milne-Watson, R. S. Snelling and Sir John W. Stephenson. Officers: J. R. W. Alexander, A. J. Clay, G. M. Newman, E. O. Rose, J. F. Rust and Colonel R. H. Studholme.

A constitution and rules for area joint committees of the Senior Gas Officers Joint Council was approved by the S.G.O.J.C. in June, 1952, since when active steps have been taken in all but two areas—North Thames and Southern—to establish such committees. It is expected that a joint committee will be established in the Southern area during the coming year.

Ten Area Committees

The 10 area joint committees met at least once during the year and established their procedure and started active work. Car allowances was one of the subjects remitted to these committees since the allowances are likely to require variation to meet local conditions.

Mr. H. A. COLE (Dorchester) proposed a vote of thanks to Mr. Alexander, Colonel Studholme, and Dr. Foxwell for their invaluable services during the past year. Mr. O. S. BRETTLE (Sedgley) seconded, and the vote of thanks was carried with acclamation.

Dr. FOXWELL, replying on behalf of all three, said the work had been intensely interesting. They all went into it with the hope of doing good and he believed they had done quite a lot of good.

Eastern Consultative Council Takes Stock

THE Eastern Gas Consultative Council met at the Connaught Rooms, London, on May 18, under the chairmanship of Alderman R. Turner, J.P., and discussed at length the recently issued Fabian Society report on consumer councils. The first period of their appointment having come to an end, it was a fitting time for members to review the work of the past three years and see how they could extend their activities on behalf of gas consumers.

An important recommendation in the Fabian Society report was to the effect that divisional committees should be reconstituted and should act on behalf of consumers of every kind of fuel, including gas and electricity.

Opinion on this point was that the work of the committee would become too heavy, that it was too early to consider a change seeing that the councils had been in existence for so short a period and that such a step would mean the end of competition between gas and electricity. Opinions were expressed that it would be a bad thing to eliminate competition. Members pointed out that nationalisation provided an opportunity for closer working between all fuel interests which would in the end conserve the nation's principal asset, coal, and bring about important economics in administration costs.

It was advocated that nationalised industries should get closer together; in this respect the Chairman of the Gas Consultative Council had already addressed the Eastern Electricity Consultative Council and an invitation was being extended to the Chairman of that Council to attend a meeting of the Gas Consultative Council.

Joint reading of gas and electricity meters was again before the Council at the request of a consumer who pointed out the savings of time if this system was adopted. Time taken in getting the householder to the door would be saved if both meters were read at the same time and this would be appreciated by the housewife who at present had to go through the process twice. Then the case of people 'not at home'; those out all day who could only let in the meter reader before or after the day's work.

Joint Accounting

All this seemed to indicate that much time could be saved if such a system were introduced. What of the office ends of the system? In these days of machine billing a definite number of meter readings each day was required to keep the operator regularly employed and if this regular flow was interrupted the saving on meter readers' time might be offset by a loss in the billing department. Joint accounting, it was suggested, might be the only practical answer to joint meter readings.

Joint showrooms where gas and electricity and even solid fuel burning appliances could be seen had been advocated by the Association of British Chambers of Commerce, but these things were not possible at present while there remained such acute competition between the fuel industries.

The Council was opposed to the idea that the divisional committees should be composed entirely of local authority representatives; it was not a fault finding committee which was envisaged under the Gas Act, but a fully fledged partnership with the Gas Board whereby the views of consumers of gas, not only domestic, but commercial and industrial users, too, could be considered and passed on to the Board.

A report was received that to meet the shortage of shillings experienced by users of slot meters in certain areas, 6 mill. shillings were issued from reserves by the end of February and a further 4 mill. had been issued since. In addition, the Royal Mint's programme for the next six months provided for striking a quantity of shillings judged to be sufficient to meet requirements.

It had been reported that the site of the proposed new gasworks at Lowestoft had been under water during the flooding and the Gas Board had pointed out that as far as it was informed, on the site of the proposed works a small area of low lying land adjoining Lake Lothing was flooded at the time of high tide because of the absence of any flood bank or other protection; no water reached the garden of Colville House in the centre of the new site.

The Federation of British Industries complained of being inadequately represented. The Council suggested that where no industrial representative served on a divisional committee, one should be appointed. A suggestion was made that the Regional Board for Industry should invite the chairmen of the divisional committees to attend whenever gas matters were being discussed.

Personal

MR. HOWARD DRAKE has been promoted to the position of General Manager and Director of General Stampers, Ltd., subsidiary company of Sidney Flavel & Co., Ltd., at Bridgend. MR. L. A. VAN DE VELDE, Manager of Sidney Flavel's engineering and foundry divisions, has also been appointed a Director of General Stampers, Ltd.

MR. C. E. GRIMWOOD, District Manager of the Sudbury, Suffolk, undertaking of the Eastern Gas Board, and a past President of the Eastern Association of Gas Engineers and Managers (now the Eastern Section of the Institution), has been elected Coronation Year Mayor of Sudbury, having already served one year as Mayor. At a reception which followed the Mayor-making ceremony thanks to the Mayor and Mayoress were expressed by Mr. R. H. Epps, Secretary of the Eastern Gas Board.

Mr. J. G. RENTON has recently been appointed to the Sales Staff of the Parkinson Stove Co., Ltd., Birmingham, and for the next few months will be going through the various departments of the Stechford Works. He was, until recently, associated with Mr. H. Friedman, in the marketing of Master Gas Cookers.

MR. J. A. FRANKLIN has been appointed Sales Manager to Sidney Flavel & Co., Ltd. MR. J. E. DOUGLAS has been appointed to the position of Office Manager, Sales Division. The following have been appointed Area Managers: MR. J. H. FISHWICK (South Eastern and Eastern); MR. H. W. JACKSON (North Western and East Midlands); MR. T. BROOK (Northern and North Eastern); MR. J. FLAVEL (West Midlands and Wales); MR. D. C. FOOTE (Southern and South Western). Additional representatives have been appointed: MR. B. R. HALPIN to assist Mr. Jackson; MR. J. A. GODLEY to assist Mr. Brook; and MR. R. A. GARNHAM to assist Mr. FOOTE. MR. S. C. GRIMWOOD has been appointed Technical Sales Representative, and MR. J. E. TWIGGER continues as Sales Service Engineer.

MR. P. E. GALLAHER, Engineer and Manager at Redditch, has been appointed by the West Midlands Gas Board to the position of Divisional Engineer, Worcestershire-Herefordshire Division, and is succeeded at Redditch as Group Engineer and Manager by MR. H. E. CHAPMAN, formerly Assistant Engineer and Manager there. The West Midlands Board has also appointed MR. D. W. DAVIDSON, formerly Engineer and Manager, Johnstone District, Scottish Gas Board, to the position of Engineer and Manager of the Kidderminster Group. Mr. E. H. MORRIS, from the North Western Gas Board's Furness undertaking, has been appointed Group Accountant at Kidderminster. MR. A. D. DUXBURY, Engineer and Manager, Leamington District, has been appointed Engineer and Manager of the Leamington and Warwick Districts.

Mr. A. J. THOMPSON, who has served Radiant Heating, Ltd., as Sales Area Manager in the Midlands for over 25 years, is confining his activities to the West Midlands Gas Board area, following many months of ill health. Radiant Heating, Ltd., have therefore appointed Mr. MONTAGUE BROWN as Sales Representative in the East Midlands and the Wales Gas Board areas, and an arrangement has been entered into with George

R. B. Reynolds

Jas. L. Thomson

Wilson Gas Meters Ltd., whereby their Area Sales Manager, Mr. R. B. REYNOLDS, ASSOC.INST.,GAS E., becomes in addition the Northern Sales Manager of Radiant Heating Ltd. The Manchester branch of George Wilson Gas Meters, Ltd., at 32/34, Cannel Street, Ancoats, Manchester 4, will also be the Northern business address of Radiant Heating, Ltd. Mr. JAS. L. THOMSON, M.I.B.E., Scottish representative of George Wilson Gas Meters, Ltd., becomes in addition the Scottish area representative of Radiant Heating, Ltd.

Diary

June 6.—SCOTTISH (EASTERN) JUNIORS: Annual Outing. Galashiels.

June 6.—SCOTTISH (WESTERN) JUNIORS: Ladies' Day: Visit to Loch Katrine and Royal Lodge.

June 8.—SOUTH EASTERN G.C.C.: Caxton Hall, Caxton Street, Westminster, S.W.1, 2.15 p.m.

June 8.—NATIONAL AND LOCAL GOVERNMENT OFFICERS' ASSOCIATION (Nalgo): Meeting of Gas Staffs, Llandudno.

June 9.—WOMEN'S GAS FEDERATION: Annual General Meeting, Caxton Hall, Westminster, S.W.1., 3 p.m.

June 9-12.—NATIONAL AND LOCAL GOVERNMENT OFFICERS' ASSOCIATION (Nalgo): Conference, Pier Pavilion, Llandudno.

June 10.—SOUTHERN G.C.C.: Bournemouth, 11 a.m.

June 10.—SOUTH WESTERN GAS CONSULTATIVE COUNCIL: Meeting, 34, Bridge Street, Taunton, 11 a.m.

June 11.—MIDLAND JUNIORS: Ladies' Day, Hereford.

June 15-16.—EASTERN SECTION, I.G.E.: Annual General Meeting, Royal Hotel, Clacton. Chairman's Address, F. A. Rhead; business meeting; 'The Case for the Deep Purifier,' R. Whiting, Divisional Engineer, Ipswich.

June 17.—LONDON AND SOUTHERN SECTION, I.G.E.: Summer Meeting, Brighton.

June 20.—MANCHESTER JUNIORS: Ladies' Day at Windermere. Bus ride to Langdales or visit to Gasworks optional.

June 20.—LONDON JUNIORS: Ladies' Day and Summer Visit to Cambridge.

June 20.—WALES JUNIORS: Summer Meeting and Ladies' Day: Visit to Whitland butane/air gas plant, followed by lunch, Royal Gate House Hotel, Tenby.

June 25.—NORTH THAMES G.C.C.: Caxton Hall, S.W.1.

June 27.—WESTERN JUNIORS: Summer Meeting and Ladies Day.

1953 'Journal' Directory

THE following changes have been notified during the past month. To keep the information in the 1953 edition of the *Gas Journal Calendar and Directory* up to date readers are invited to note these alterations (together with the appropriate adjustments relating thereto in the 'Personnel' section of the *Directory*, pp. 141-156):

Page 32.—LEICESTER AND NORTHANTS DIVISION: J. Corrigan, *Div. Sales and Service Manager;* J. A. Henry, *Senior Tech. Assistant.*

„ 32.—LEICESTER AND RUTLAND SUB-DIVISION: Delete W. A. Pask, *Sub.-Div. M.* (The position of Sub.-Divisional Manager has lapsed and the Sub-Division is now under the direct control of the Divisional General Manager.)

„ 33.—NORTHAMPTON GROUP: Delete J. Corrigan, *Senior Group M.*

Page 33.—MARKET HARBOROUGH: Delete J. A. Henry, *Group M.*

„ 33.—RUSHDEN: C. J. Alsop, *Works Supt.*

„ 34.—GRIMSBY: W. A. Pask, *Group M.*, vice F. Harvey.

„ 37.—EASTERN GAS BOARD: Add S. A. King, *Commercial Manager.*

„ 43.—TOTTENHAM DIVISION: Delete S. A. King, *Div. Sales and Service Manager.*

„ 47.—NORTH EASTERN GAS BOARD: Add E. Neville Duffield, *Part Time Member.*

„ 70.—WIRRAL GROUP AND BIRKENHEAD UNDERTAKING: T/N (Group head office and Birkenhead undertaking) Birkenhead 8481; consumer service (Birkenhead), Birkenhead 7481.

„ 89.—SOUTH WESTERN GAS BOARD: Add Hon. D. E. Hely-Hutchinson, *Part Time Member.*

„ 115.—WEST MIDLANDS GAS BOARD: Add Sir Arthur Smout, *Part Time Member.*

„ 118.—WALSALL: F. Harvey, *Deputy Div. G.M.*

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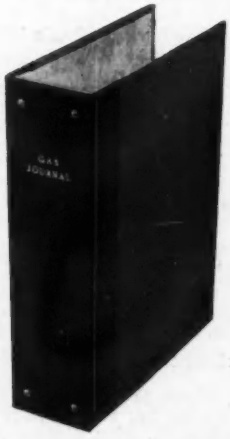

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The "Gas Journal" is published every Wednesday, price 1/3d.; by post 1/5d.

Subscription Rates: Home and Empire :- 52/- per annum; Foreign :- 60/- per annum. (Both payable in advance.) A copy of the "Gas Journal" Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words) - minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

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The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

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SCOTTISH GAS BOARD

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APPLICATIONS for the position of DISTRICT MANAGER at the above Undertaking are invited from persons with adequate practical experience in distribution and sales and in the operation and control of a small Gas Works.

The salary for the post is Intermediate Grade VI Provincial 'B' (£435-£480). A house free of rent and rates is provided, together with free fuel and light.

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H. S. MILNE,
Divisional Controller.

50, Cotton Street,
Aberdeen.
May 18, 1953.

NORTHERN GAS BOARD

DARLINGTON DIVISION
SALES SUPERINTENDENT

APPLICATIONS are invited for the position of DIVISIONAL SALES SUPERINTENDENT. Candidates must be fully qualified and capable of taking charge of all sales activities, display, publicity and exhibition work.

The salary for the position will be within Grade A.P.T. IX, Provincial 'A', £615-£715 per annum, initial placing according to qualification and experience.

The successful candidate will be required to pass a medical examination and join the Board's Pension Scheme.

Applications, stating age, personal details, qualifications and experience, together with the names of two referees, should be addressed to the undersigned not later than June 24, 1953.

F. WILSON,
Divisional General Manager.

Gas Offices,
John Street,
Darlington.
May 27, 1953.

PATENTS

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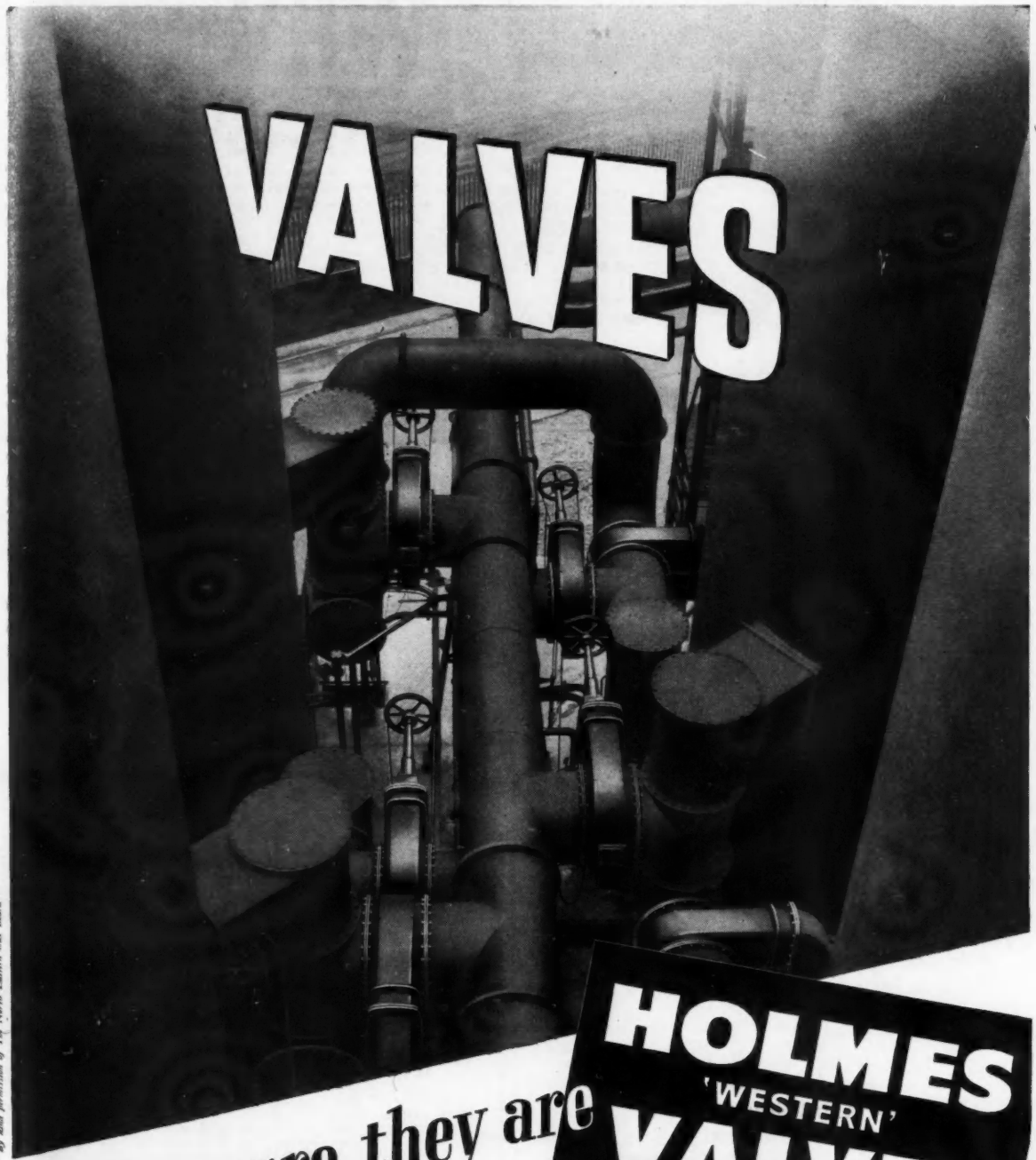

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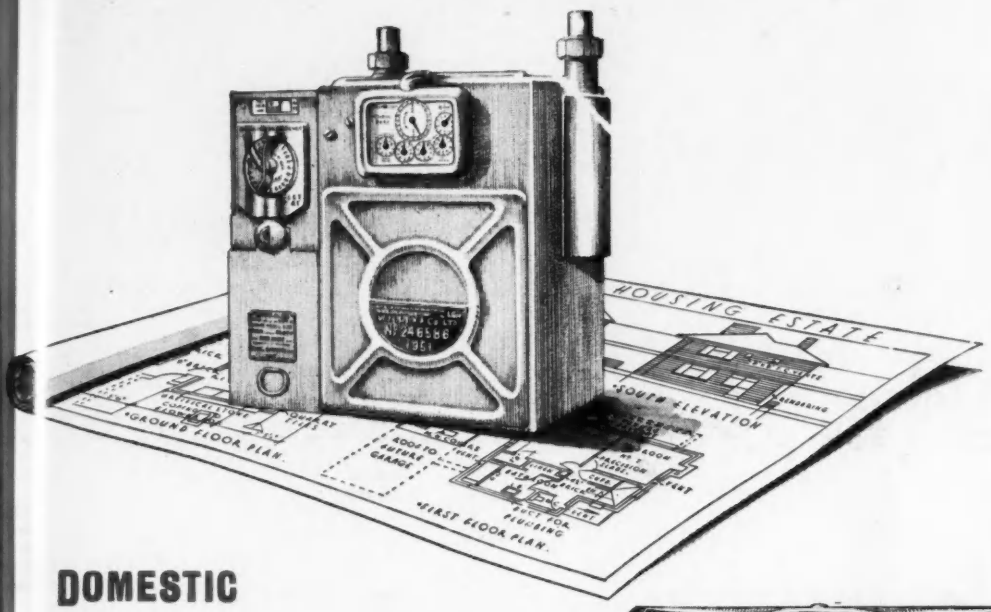

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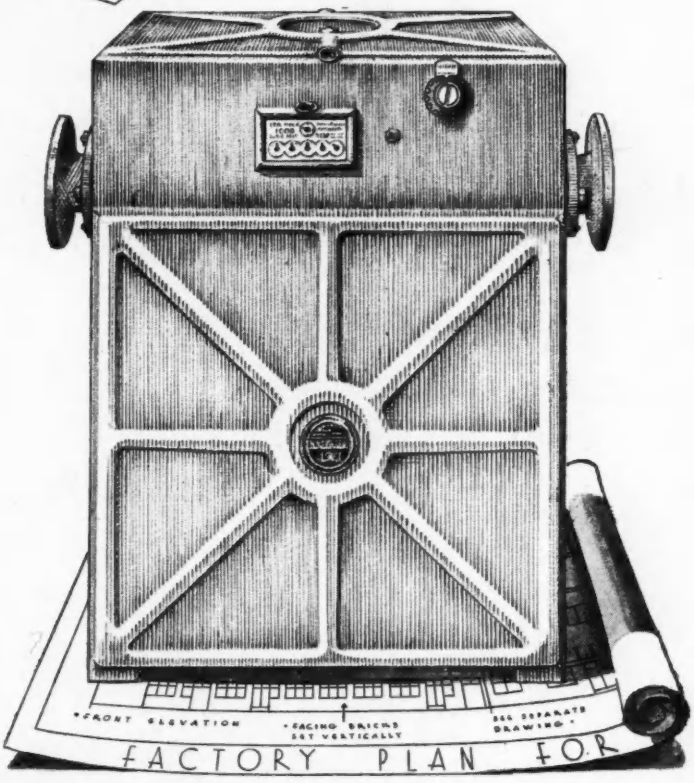

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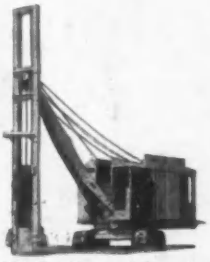

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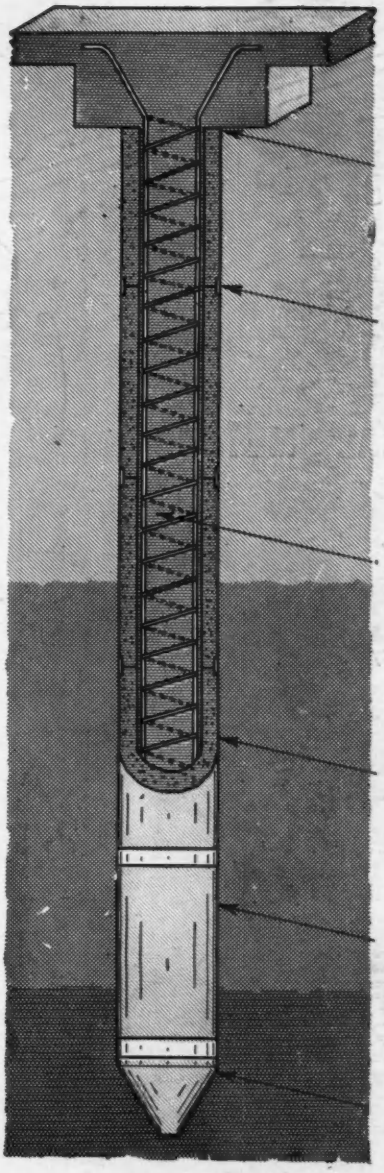

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